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PHYSICAL CONSTANTS OF HYDROCARBONS

Volume II
CYCLANES, CYCLENES, CYCLYNES,
and
OTHER ALICYCLIC HYDROCARBONS

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CHICAGO, ILLINOIS



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Dedicated to
JOSEPH G. ALTHER

GENERAL INTRODUCTION

American Chemical Society Series of Scientific and Technologic Monographs

By arrangement with the Interallied Conference of Pure and Applied Chemistry, which met in London and Brussels in July, 1919, the American Chemical Society was to undertake the production and publication of Scientific and Technologic monographs on chemical subjects. At the same time it was agreed that the National Research Council, in coöperation with the American Chemical Society and American Physical Society, should undertake the production and publication of Critical Tables of Chemical and Physical Constants. The American Chemical Society and the National Research Council mutually agreed to care for these two fields of chemical development. The American Chemical Society named as Trustees, to make the necessary arrangements for the publication of the monographs, Charles L. Parsons, secretary of the society, Washington, D. C.; the late John E. Teeple, then treasurer of the society, New York; and Professor Gellert Alleman of Swarthmore College. The Trustees arranged for the publication of the A. C. S. series of (a) Scientific and (b) Technologic Monographs by the Chemical Catalog Company, Inc. (Reinhold Publishing Corporation, successors) of New York.

The Council, acting through the Committee on National Policy of the American Chemical Society, appointed editors (the present list of whom appears at the close of this introduction) to have charge of securing authors, and of considering critically the manuscripts submitted. The editors endeavor to select topics of current interest and authors recognized as authorities in their respective fields.

The development of knowledge in all branches of science, especially in chemistry, has been so rapid during the last fifty years, and the fields covered by this development so varied that it is difficult for any individual to keep in touch with progress in branches of science outside his own specialty. In spite of the facilities for the examination of the literature given by Chemical Abstracts and by such compendia as Beilstein's *Handbuch der Organischen Chemie*, Richter's *Lexikon*, Ostwald's *Lehrbuch der Allgemeinen Chemie*, Abegg's and Gmelin-Kraut's *Handbuch der Anorganischen Chemie*, Moissan's *Traité de Chimie Minérale Générale*, Friend's and Mellor's *Textbooks of Inorganic Chemistry* and Heilbron's *Dictionary of Organic Compounds*, it often takes a great deal of time to coördinate

the knowledge on a given topic. Consequently when men who have spent years in the study of important subjects are willing to coördinate their knowledge and present it in concise, readable form, they perform a service of the highest value. It was with a clear recognition of the usefulness of such work that the American Chemical Society undertook to sponsor the publication of the two series of monographs.

Two distinct purposes are served by these monographs: the first, whose fulfillment probably renders to chemists in general the most important service, is to present the knowledge available upon the chosen topic in a form intelligible to those whose activities may be along a wholly different line. Many chemists fail to realize how closely their investigations may be connected with other work which on the surface appears far afield from their own. These monographs enable such men to form closer contact with work in other lines of research. The second purpose is to promote research in the branch of science covered by the monograph, by furnishing a well-digested survey of the progress already made, and by pointing out directions in which investigation needs to be extended. To facilitate the attainment of this purpose, extended references to the literature enable anyone interested to follow up the subject in more detail. If the literature is so voluminous that a complete bibliography is impracticable, a critical selection is made of those papers which are most important.

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Preface

The alicyclic hydrocarbons are available in nature to an enormous extent. Petroleum is the greatest potential source of the cyclanes or cycloparaffins (naphthenes). The oil production of the world for 1939 was about 2,000,000,000 barrels, of which 500,000,000 were cyclane hydrocarbons. This volume of cyclanes was largely consumed as motor fuel, kerosene, gas oil, Diesel oil, lubricants, and as fuel for household and industrial use.

A new chemical industry could well be developed based upon cyclane chemistry, to which very little research has been directed. At the moment a new chemical industry is being founded in the aliphatic hydrocarbons derivable from petroleum and natural gas. The chemistry of the cyclenes through essential oils and their polymerization has been studied through the years.

The collation of the physical constants, melting point, boiling point, specific gravity, and refractive index of the alicyclic hydrocarbons has been made in order to facilitate and energize research for chemical derivatives of scientific and utilitarian use in this potentially fruitful field.

The author deeply appreciates the assistance of his colleagues, Dr. J. Sherman, Prudence M. Van Arsdell, Dr. R. B. Dull, Dorothy V. Nordman, Dorothy Sigman, and Mary Alexander in this collation and critical study of the physical constants of the alicyclic hydrocarbons.

GUSTAV EGLOFF

February 15, 1940

Physical Constants of Hydrocarbons

Cyclanes, Cyclenes, Cyclynes, and Other Alicyclic Hydrocarbons

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I. Introduction

1. Foreword

The present volume is the second of a four-volume work on the collation and systematic study of the physical constants of all classes of pure hydrocarbons. Volume I, which was published in March 1939, includes the paraffins, olefins, acetylenes, and other aliphatic compounds. The physical constants of the cyclanes or cycloparaffins, cyclenes or cycloolefins, and other alicyclic compounds are reported in Volume II. All cyclic hydrocarbons containing nonaromatic rings have been critically evaluated in this study. The literature and our own and other experimenters' work have been reviewed in order to present all the data which has been available to March 1939.

In comparing the alicyclic hydrocarbons with those of the aliphatic series, it may be pointed out that the former group has not been as extensively studied as the latter as regards physical constants. This is due, in part, to the fact that the aliphatic hydrocarbons have been of more scientific and industrial importance for a longer time than the alicyclic compounds.

The data on the four physical constants melting point, boiling point, specific gravity, and index of refraction of the liquid hydrocarbons are more inconsistent for the alicyclic than for the aliphatic hydrocarbons. The greater difficulty of preparing pure alicyclics probably accounts for this, and also the constants reported in many cases are for mixtures of geometrical isomers rather than individual compounds. A further difficulty in obtaining precise physical constant values for a number of alicyclic hydrocarbons is that they may partially isomerize while the determination is being made due to catalytic influences of the apparatus.

The greater inaccuracy of the alicyclic constants is evidenced by the adopted values of the constants, which are given to fewer significant figures than is the case for the aliphatics. The specific gravity and index of refraction values are given to three significant figures in almost all cases as compared to four and five for the aliphatic compounds.

In contrast to the studies which have been made by various workers in correlating physical constants of aliphatic hydrocarbons, almost nothing of this character has been carried out for the alicyclic hydrocarbons.

2. The Structure of Alicyclic Hydrocarbons

A. INTRODUCTION

Although much experimental and theoretical work has been done in recent years in order to determine the structures of alicyclic hydrocarbons, the problem cannot be regarded as solved up to the present time (August 1939). The term structure is used here to denote the relative positions of the atomic nuclei in the molecule and not the electronic structure.

The fundamental postulate concerning the tetrahedral structure of a carbon atom stated by LeBel and van't Hoff in order to explain optical isomerism was also a method of presenting a valid picture of stereochemistry until the discovery of cyclic compounds in nature and in the laboratory. Due to this discovery, the idea of the rigid tetrahedral angle of $109^{\circ} 28'$ was necessarily modified. The six-membered ring of the alicyclic group was the first to be prepared and since the other members of the series, cyclopropane, cyclobutane, cyclopentane and others higher than cyclohexane were unknown in nature, and impossible to synthesize by laboratory methods in use before 1880¹, it was argued that they did not exist due to theoretical considerations then generally accepted.

A compound containing a cyclobutane ring and the discovery of cyclopropane between 1880 and 1885 led to the modification of the ideas concerning the existence and possible stability of the cyclic compounds, and in 1885 Baeyer² proposed the strain theory to explain the relative stabilities of cyclopropane, cyclobutane, cyclopentane, and cyclohexane. His theory, however, did not explain the existence of the higher ring compounds.

Since the time of Baeyer, the higher ring compounds have been synthesized and a theory for strainless ring structures³ has been developed which will be discussed later.

B. GENERAL CONSIDERATIONS

One of the fundamental postulates of structural organic chemistry is that the angles between the carbon-carbon bonds in a saturated hydrocarbon molecule are tetrahedral. Many facts accumulated through the years support this postulate. Within recent years the tetrahedral nature of the carbon atom in a few simple cases has been directly verified by experiments determining the crystal structure of hydrocarbons by x-ray diffraction, by electron diffraction of gases, and by spectroscopic analysis. Evidence has also accumulated showing that the radius of the carbon atom in saturated compounds is nearly constant at 0.77 Å. (the bond distance between two atoms is equal to the sum of the atomic radii). If this were not so, then planar rings having tetrahedral angles could be constructed having more carbon atoms than cyclopentane. Bond angles in saturated ring compounds should be tetrahedral, just as in aliphatic hydrocarbons. For cyclopropane and cyclobutane and many other compounds containing fused rings such as carene or bicyclohexane this is geometrically impossible.

It is possible to construct a six-membered ring, cyclohexane, in which the carbon-carbon bond distances are equal, and the angles all tetrahedral; hence the ring will not be planar. This was clearly pointed out by Sachse⁴ and later elaborated upon by Mohr⁵ in order to show that rings containing more than five carbon atoms need not be strained as Baeyer believed. It remained for Cohen-Henriquez⁶

- (1) Meyer, *Ann.*, **180**, 192, 1876
- (2) Baeyer, *Ber.*, **18**, 2278, 1885
- (3) Ruzicka, Stoll, Huyser, and Boekennoogen, *Helv. Chim. Acta*, **13**, 1152, 1930
- (4) Sachse, *Ber.*, **23**, 1363, 1890
- (5) Mohr, *J. prakt. Chem.* (2), **98**, 349, 1918
- (6) Cohen-Henriquez, *Proc. Roy. Acad. Amsterdam* **37**, 532, 1934

to give a thorough mathematical treatment of the cyclohexane problem. He showed that it is possible to construct not only one but an infinite set of strainless cyclohexane rings. One of the members of this set, the so-called chair form of cyclohexane, is a singular one in that it cannot be derived from any of the others by a simple distortion not accompanied by a change in the bond angles. The other members of the set, of which the boat form is representative, can all be obtained from any one of them by twisting, not accompanied by bond angle change.

The point of chemical interest in this discussion is that if many forms of cyclohexane actually exist, then it should perhaps be possible to separate isomers corresponding to some of the different possibilities. What is even more pertinent to the present study is the wide variation in the physical constants of cyclohexane reported by investigators, which may in part be attributed to a partial or even complete separation of the boat and chair forms, and similarly for other alicyclic compounds. As a matter of fact, claims are made from time to time that such isomers have been separated. The most recent claim to the separation of the forms of methylcyclohexane is that reported by Vogel⁷. These results have been disputed by Wibaut, Langedijk, Smittenberg, and Hoog⁸; hence further studies should be made.

Although it is apparently impossible to separate the chair and boat forms of cyclohexane in the liquid state, the x-ray diffraction study of the structure of the crystals strongly indicate that the molecules are of the chair form.

In order to reconcile theory and experimental facts, it has been suggested that the possible forms of cyclohexane are in rapid equilibrium so that the statistical average corresponds to a plane structure. If it is assumed that cyclohexane oscillates between the chair and boat forms (the boat form is used here collectively to signify all the structures which may be derived from it by simple distortion), the low frequency of oscillation must be of negligible importance in increasing the stability relative to the individual forms. Also, it is by no means obvious that the activation energy in the conversion of the boat to the chair form is negligibly small.

The bond distances are more important in determining the structure than the bond angles, since it requires considerably more energy to change the normal carbon-carbon single bond distance a small amount than it does to change the bond angle.

Let us now consider the geometrical problem of determining how many forms of an equilateral, equiangular polygon of n sides may be constructed from a set of n points located at the vertices. The general case is extremely difficult and has not been treated. An equilateral, equiangular polygon of n sides may be constructed in which the sides are of any given length. However, the angles must have an average value equal to or less than $\left(\frac{n-2}{n}\right)\pi$. If the angles in the ring are each equal to the upper limit of $\left(\frac{n-2}{n}\right)\pi$, the ring is a planar one, and there is one and only one such ring which can be constructed. If, however, the angles are less than $\left(\frac{n-2}{n}\right)\pi$, the regular polygon will not be a plane. Moreover, as Cohen-

(7) Vogel, *J. Chem. Soc.*, 1938, 1323

(8) Wibaut, Langedijk, Smittenberg, and Hoog, *Chem. and Ind.*, 57, 753, 1938

Henriquez showed for cyclohexane, it will, in general, be possible to construct more than one such polygon for a given value of the angle.

Since two single bonds associated with a carbon atom which is part of a double bond tend to be at 120° angles to the double bond, and since the carbon-carbon double bond distance is about 14 per cent shorter than the carbon-carbon single bond distance, the introduction of one or more double bonds into a saturated ring will tend to change the ring configuration to some extent.

C. MONOCYCLIC RINGS OF THE ALICYCLIC SERIES

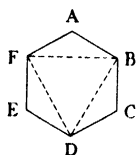
1. Cyclopropane, Cyclobutane, and Cyclopentane

The equilibrium positions of the carbon nuclei in each of these molecules are located at the vertices of an equilateral triangle, a square, and a regular pentagon respectively. The four carbon nuclei in cyclobutane are not geometrically required to lie in a plane. However, they probably are coplanar, for otherwise the average bond angle would be less than 90° , and the molecule would be less stable than the plane form.

In each of the cyclopropane, cyclobutane, and cyclopentane molecules, the two hydrogen bonds associated with each carbon are probably at the tetrahedral angle to each other, the plane of the bonds being perpendicular to the plane of the ring and bisecting the pertinent carbon bond angle.

2. Cyclohexane

Reference has already been made to the work of Cohen-Henriquez in which it was shown by methods of analytical geometry that there are an infinite number of possible cyclohexane rings in which the bond distances are all equal and the bond angles all tetrahedral. The configuration of any one possibility may be described by reference to the following figure:

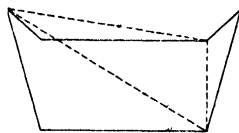


Since the bond distances and bond angles are to remain fixed, the large triangle BDF will remain invariant to all permissible forms of the cyclohexane ring.

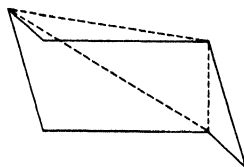
Let ϕ_1 , ϕ_2 , and ϕ_3 denote the angles which the small triangles ABF , BDC , and DEF make with the plane of the triangle BDF respectively. The configuration of the ring is completely specified when the values of the three angles ϕ_1 , ϕ_2 , and ϕ_3 are given. For the "fixed" or chair configuration

$$\phi_1 = \phi_2 = \phi_3 = \cos^{-1}(\sqrt{\frac{2}{3}}) = \pm 35^\circ \text{ (approx.)}$$

The following figures depict the boat and chair forms respectively:



boat form



chair form

In each of these two forms there are four carbon atoms in a plane at the corners of a rectangle. In the boat form, the remaining two carbon atoms are both on the same side of the plane of the other four, and in the chair form, the two carbon atoms not in the plane of the other four are on opposite sides of this plane. For this reason, the boat form is sometimes referred to as the *cis* and the chair type as the *trans* form.

D. CYCLOPARAFFINS CONTAINING FUSED RINGS

The carbon skeleton of the molecule [0,2,2]-bicyclohexane is usually written as



Corresponding to this drawing, it may be described as the boat form

of cyclohexane in which the 1,4-carbon atoms are bonded to each other. If the cyclohexane ring were undistorted, this bond would be $\frac{2}{3} = 1.67$ times as long as the bonds in the ring. (The 1,4- atoms in the chair form of cyclohexane are $\frac{1}{3}\sqrt{33} = 1.915$ times as far apart as the adjacent atoms in the ring, and a bond in this case would be even weaker than in the case being considered). Moreover, the two cyclobutane rings would be isosceles trapezoids in which two of the angles were tetrahedral and two of the angles $70^\circ 32'$. But from the structural principles already elaborated, it may be concluded that in [0,2,2]-bicyclohexane the 1,4- bond is not appreciably different from the other carbon-carbon bonds in the ring, and that the carbon skeleton consists of two cyclobutane rings (squares) the planes of which are inclined to each other at approximately the tetrahedral angle.

It is believed that [0,2,2]-bicyclohexane reacts rather readily to form derivatives of cyclohexane; and this is sometimes given as evidence that the 1,4- bond in the bicyclohexane is much weaker than the other carbon bonds. This argument is unreliable for the following reasons: if one of the carbon-carbon bonds in the bicyclohexane is broken, e.g., by the addition of hydrogen, the possible products are 1,2-dimethylcyclobutane, ethylcyclobutane, and cyclohexane. Cyclohexane is the most stable of these hydrocarbons; hence it is formed, assuming, of course, that the activation energy of this reaction is less than for the other reactions.

The foregoing discussion for [0,2,2]-bicyclohexane brings out certain general features of the structure of shared rings. This compound (as well as all other "bi" cyclocompounds) really contains three rings—two cyclobutane rings having a side in common, and a cyclohexane ring, three sides of which are common to one of the

cyclobutane rings and the other three sides to the other. The smaller rings are more important from energy considerations than the large one, *i.e.*, the cyclobutane rings tend to be squares at the expense of the regular cyclohexane ring. Similar considerations apply to other rings. For example [0,1,3]-bicyclohexane may be written as a cyclohexane with a bond between the 1,3-atoms; however, it is more nearly a regular pentagon and an equilateral triangle sharing a side, the plane of the triangle being inclined to the plane of the pentagon at the tetrahedral angle.

E. ALICYCLIC HYDROCARBONS CONTAINING DOUBLE AND TRIPLE BONDS

Cyclopropene has not been synthesized as yet. This is not surprising, for a consideration of the bond angles involved shows that cyclopropene would be highly unstable.

Cyclobutene is known, but not cyclobutadiene. The small increase in stability that would result from the resonance energy in the latter case is not sufficient to offset the instability due to 90° bond angles between conjugated bonds.

The introduction of one or two double bonds in the cyclohexane ring causes it to assume a configuration intermediate between benzene and cyclohexane.

In a very few cases rings containing triple bonds have been reported. These compounds would probably be unstable.

In the discussion of the structure of alicyclic ring hydrocarbons, it was assumed that the general structural features of these rings are determined by the carbon-carbon bond distances and the carbon-carbon bond angles. This is only an approximation. Other factors may be of significance—*e.g.*, the van der Waals' forces, the zero-point energy, and particularly the interaction of the carbon-hydrogen bonds with the carbon-carbon bonds in the ring⁹. Studies on the last factor are being made and will be reported in the fourth volume of this study of the physical constants of hydrocarbons.

F. GEOMETRICAL ISOMERISM

In the study of aliphatic hydrocarbons, it was pointed out that geometrical isomerism in the olefins occurs whenever a 180° rotation about the double bond of one of the two groups attached by the double bond would result in a molecular configuration which could not be converted to the original by any rotations of the molecule as a whole; *e.g.*, butene-2 has two geometrical isomers, the *cis*-butene-2 has the structure $\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} = \text{C} \\ & / & \diagdown \\ \text{C} & & \text{C} \end{array}$, whereas the *trans*-butene-2 has the structure

$\begin{array}{c} \text{H} & & \text{C} \\ & \diagdown & / \\ & \text{C} = \text{C} \\ & / & \diagdown \\ \text{C} & & \text{H} \end{array}$. This group isomerism is due partly to the inability of rotation to take place about the double bond. In the alicyclic compounds geometrical isomerism also occurs for an additional reason—the lack of rotation about carbon-carbon single bonds which are part of a ring system. Geometrical isomerism in the alicyclic compounds is, consequently, a more prevalent phenomenon than in the aliphatic compounds.

(9) Cohen, Kistiakowsky, and Smith, *J. Am. Chem. Soc.*, **61**, 1870, 1939; Govin, Walter, and Eyring, *ibid.*, **61**, 1876, 1939

Since geometrical isomers possess different physical properties their constants should be evaluated separately. In a few cases, the investigator has explicitly stated that his compound is *cis* or *trans*, and these have been listed as such in the tables. In the majority of cases where geometrical isomers are theoretically possible, the physical constants are reported without mention by the experimenter as to whether his compounds are the pure *cis* or pure *trans* isomer or some mixture of these. In accordance with the procedure of tabulating the constants adopted for the aliphatic olefins, the alicyclic constants are listed, but no effort was made to obtain an average value for possible mixtures of *cis* and *trans* isomers.

As has already been discussed in the section on structure, geometrical isomerism is a complicated phenomenon in the alicyclic compounds. Except for the simpler cases it is not usually possible to state definitely how many isomers are possible. Almost all the shared rings can exhibit geometrical isomerism, and therefore, the constants for these compounds have been evaluated in only a few cases.

The possibilities of geometrical isomerism become quite complex in shared ring systems. Cohen-Henriquez investigated the perhydronaphthalene ring and found that several fixed and mobile configurations are possible. Actually perhydronaphthalene has been separated into *cis* and *trans* isomers having different physical constants. In other shared ring systems, the physical constants are, with few exceptions, reported without mention of the possibility of geometrical isomerism.

3. Nomenclature of Alicyclic Hydrocarbons

A. INTRODUCTION

The nomenclature of alicyclic hydrocarbons is in a confused state due to the many terms and numbering systems used. In some cases the same experimenter has named and numbered the alicyclic hydrocarbons several ways in the same publication without explanation. The nomenclature rules for this series of hydrocarbons are not as extensive, and in some cases not so clearly defined as those used for the aliphatic compounds. An attempt has been made in the present study to bring about uniformity in the numbering and naming of the alicyclic hydrocarbons. The saturated cyclic compounds were originally called polymethylenes and the term still persists due to the chemical formulae being multiples of methylene. Each compound was named by means of the Greek numerical prefix plus methylene, hence cyclopentane was first known as pentamethylene. Several disadvantages of this naming system developed as work progressed in alicyclic chemistry. The term polymethylenes was too inflexible to be of value due to the fact that the term applied only to the single ring saturated structures.

Other terms applied to alicyclic hydrocarbons and widely used are naphthenes, hydroaromatics, and terpenes. The terpene classification has been omitted from separate consideration in this study, since it is recognized that the members of this group are classified in their proper alicyclic series. The terpene names have been retained in addition to the systematic ones assigned in the Geneva system. In so arranging the terpenes, it is hoped that structural relationships will be shown throughout the different series rather than for individual compounds in the usual terpene groupings. Although there are generic group names given to the naph-

thenes, polymethylenes, and hydroaromatics, they are not classified under these terminologies.

The disadvantages imposed by such names as polymethylenes, naphthenes, hydroaromatics, and terpenes are overcome by the more systematic terms which include cyclanes, cycloalkanes, or cycloparaffins; cyclenes, cycloalkenes, or cycloolefins; cyclynes, cycloalkynes, or cycloacetylenes. *Chemical Abstracts*¹⁰ uses the terms cyclanes, cycloalkanes, cycloparaffins, and naphthenes to cover the cyclic hydrocarbons of the general formula C_nH_{2n} .

In this study of the physical constants of alicyclic hydrocarbons, the terms *cyclanes*, *cyclenes*, and *cyclynes* are used generically for the monocyclic compounds due to the simplicity of the terms compared to the others which have been used.

B. GENEVA NOMENCLATURE

1. Introduction

The rules used in this study were obtained in part from the Definitive Report of the Commission on the Reform of Nomenclature of Organic Chemistry and the Council of the International Union of Chemistry¹¹. The data in Beilstein were also used where the Geneva rules were not sufficient. These two sources of nomenclature generalizations were found insufficient for the complete study and were supplemented by the author.

2. Rules and Author's Comments

a. Monocyclics

The following rules¹¹ are quoted from the Definitive Report:

"11. Saturated monocyclic hydrocarbons will take the names of the corresponding straight chain saturated hydrocarbons, preceded by the prefix '*cyclo*.' They will bear the generic term cycloalkanes."

Author's note. In this study the term cyclanes has been used instead of cycloalkanes.

"13. When they (alicyclics) are unsaturated Rules 8 and 9 will be applied. However, in the case of partially saturated polycyclic aromatic compounds, the prefix *hydro* preceded by *di*-, *tri*-, *tetra*-, etc., will be used. Example—Dihydroanthracene."

Author's note. The Geneva¹¹ Rules 8 and 9 have been adapted on the basis of Rule 13 so as to apply to the alicyclic hydrocarbons.;

Rule 8. In the names of unsaturated cyclic hydrocarbons having one double bond, the ending *-ane* of the corresponding saturated hydrocarbon will be replaced by the ending *-ene*; if there are two double bonds, the ending will be *-diene*, etc. These hydrocarbons will bear the generic names *cyclenes*, *cyclodienes*, *cyclotrienes*, and *cyclotetraenes* except in aromatic structures.

Rule 9. The names of triple bond cyclic hydrocarbons will end in *-yne*. They will bear the generic names *cyclynes*.

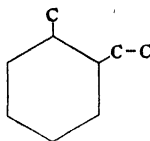
(10) *Chem. Abs.*, Index, 1938

(11) Patterson, *J. Am. Chem. Soc.*, 55, 3905, 1933

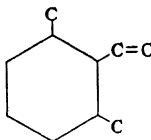
"Rule 49a¹². Cyclic hydrocarbons with aliphatic side chains are to be named according to one of the two following methods: (a) The radical names denoting the side chains are prefixed to the name of the cyclic hydrocarbon. (b) The cyclic hydrocarbon residue, if it can be named as a radical, is considered a substituent of the aliphatic chain.¹²

"Naming according to (a) is in general preferable when the side chain is short or when several side chains are present. Naming according to (b) is more convenient when the side chain is long, and particularly when the cyclic hydrocarbon residue is not at the end of this chain."

Author's examples:



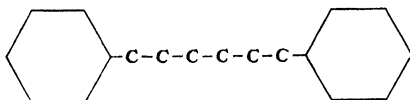
1-Methyl-2-ethylcyclohexane



1,3-Dimethyl-2-ethenylcyclohexane

"When several cyclic hydrocarbon residues are united by an aliphatic chain the name of the compound will be derived from that of the aliphatic hydrocarbon, provided radical names are available for the cyclic hydrocarbon residues."

Author's example:



1,6-Dicyclohexylhexane

The following rules for numbering and presentation of the various ring systems used throughout this study of alicyclic hydrocarbons are taken from the "Proposed International Rules for Numbering"¹².

The adaptations of the rules with explanations of the changes necessary in this study, together with present practices are given in *Chemical Abstracts Index* for 1938. Only those rules which may apply to the alicyclic hydrocarbons are reported here¹³ despite the fact that the rules are not specific enough.

"A. THE SYSTEM CONSISTS OF A SINGLE RING

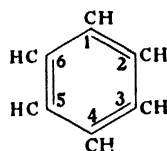
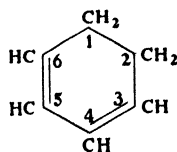
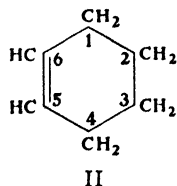
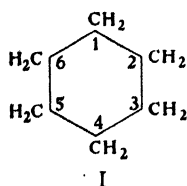
I. The ring is carbocyclic

Rule 1. "Number around the ring in such a manner as to give to hydrogen atoms the lowest numbers possible.

(12) Latest text adopted at Lucerne 1936, and confirmed in Rome, 1938, *Science*, **87**, No. 2253 216, 1938

(13) Patterson, *J. Am. Chem. Soc.*, **47**, 543, 1925, *Chem. Abs.*, Index, 1938

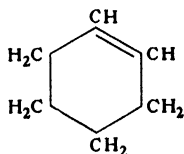
"Examples:



"Note 4. Fixed orientations are an aid to memory and should not be neglected. Single rings should be oriented with Position 1 at the top and with numbers proceeding clockwise around the ring."

Author's note: The latest *Chemical Abstracts* practice¹⁰ regarding the bond placement in the ring reverses Rule 1 and gives the double bond the lowest number possible rather than the hydrogen previously shown.

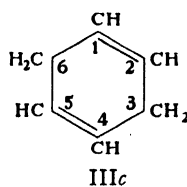
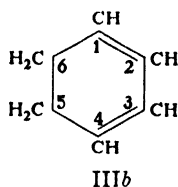
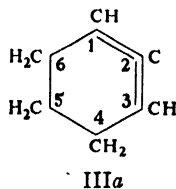
Example:



This is in line with the rule covering aliphatic hydrocarbons where the lowest number is given to the double or triple bond when they appear singly in the compound. It is more convenient in this study to follow this system for the ring compounds instead of Rule 1.

In the six membered cycloolefins there are three positions possible for the bonds, the 1,2; 1,3 and 1,4; the substituting groups are oriented with higher or lower numbers in respect to the double bonds.

Examples:



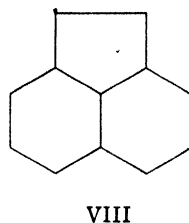
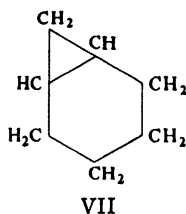
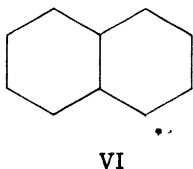
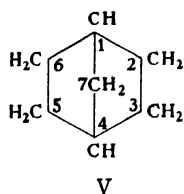
A cycloolefin of 1,2 structure as shown has been reported and the constants shown in the tables, although there is doubt as to the existence of such a compound.

Examples IIIa, IIIb, and IIIc are used throughout our study and supplant Examples II and III of Rule 1 made in 1925.

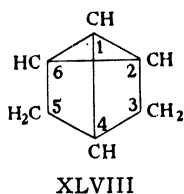
b. Polycyclics

"B. THE SYSTEM CONTAINS AT LEAST TWO RINGS OF FIVE OR MORE MEMBERS, BUT NO ATOMIC BRIDGES, CROSSED VALENCE BRIDGES OR FREE SPIRO UNIONS

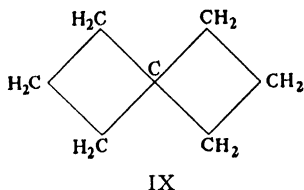
"Note 6. An 'atomic bridge' is one that contains atoms (*e.g.*, the bridge in norcamphane, V) as contrasted with a 'valence bridge' (*e.g.*, that in naphthalene, VI, or in norcarane, VII).



"Note 7. 'Crossed valence bridges' are valence bridges that are represented by the plane formula as crossing each other as shown in Example XLVIII.





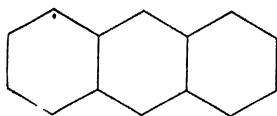
"Note 8. A 'spiro union' is one formed by a single atom which is the only common member of two rings. A 'free spiro union' is one constituting the *only* union direct or indirect, between two rings as in IX. Systems in which the rings are united in some other way (that is by intermediate rings) as well as by the spiro union are not necessarily excluded from Class B.



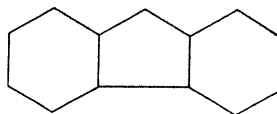
"Note 9. In determining whether or not a system contains at least two rings of five or more members, one counts as component rings *only the smallest number of smallest rings that together will account for all the atoms and valences.*

"Rule 6. Orient the formula so that the greatest possible number of rings will be in a horizontal row.

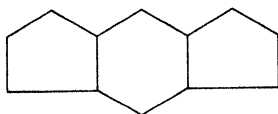
"Note 10. Triangles in such a row should have one side vertical, other rings two sides vertical (this requires a deformation of the polygons with an odd number of sides, thus:  or ). Accordingly, hexagons should have angles, not sides, at top and bottom. Anthracene (XIII) constitutes a horizontal row of three, so do fluorene (XIV) and s-indacene (XV), but phenanthrene (XVI) does not."



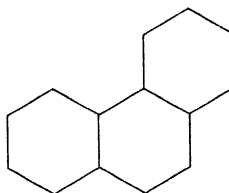
XIII



XIV



XV

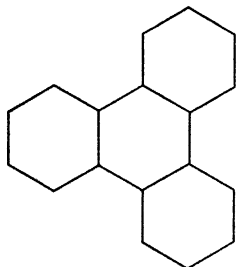


XVI

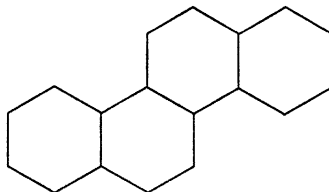
Author's note: The use of regular polygons such as a regular pentagon for cyclopentane, etc., have been used in the tabulated data since it is thought that these structural configurations more nearly represent the equilibrium position of the atoms in the molecule.

Rule 7. Of orientations conforming to Rule 6, choose the one that places as many as possible of the remaining rings above and to the right.

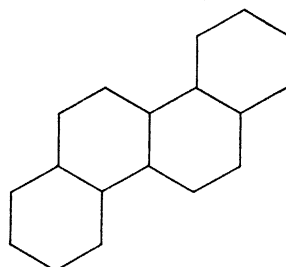
Note 11. Only the *number* of rings and not their size or distance from the center, is taken into account. When the correct orientation is not immediately apparent, bisect the 'horizontal row' by a horizontal axis and a vertical axis (as in XXI) and count the rings and fractions of rings in the four quadrants. If there is more than one combination of rings that could serve as the 'horizontal row,' apply the bisection in the other cases also (as in XXII). Choose the orientation that has as many as possible of the 'remaining rings' in the upper right quadrant; if two or more orientations meet this requirement, choose the one of them that has as few rings as possible in the lower left quadrant. In the examples, phenanthrene (XVI) is shown correctly oriented with its single 'remaining ring' turned upward toward the right; triphenylene (XVII) has one in the upper right quadrant and one in the lower right; Examples XVIII-XX show right and wrong orientations of chrysene; and XXI and XXII show right and wrong orientations in a case that might not be immediately apparent.



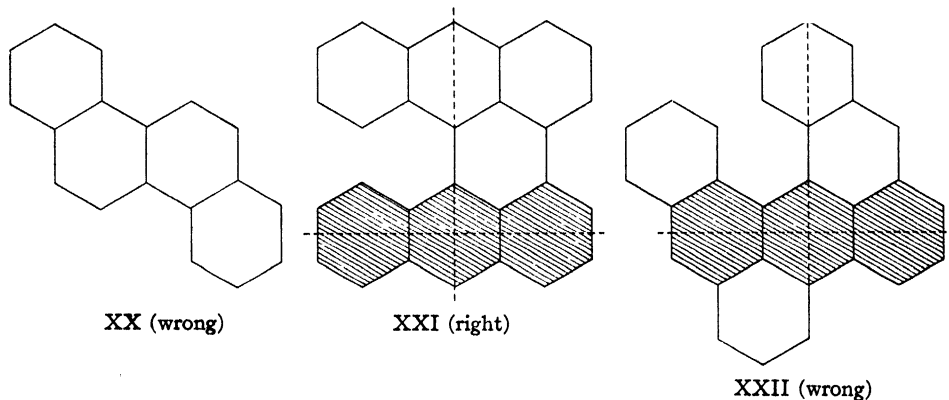
XVII Triphenylene



XVIII (right) Chrysene

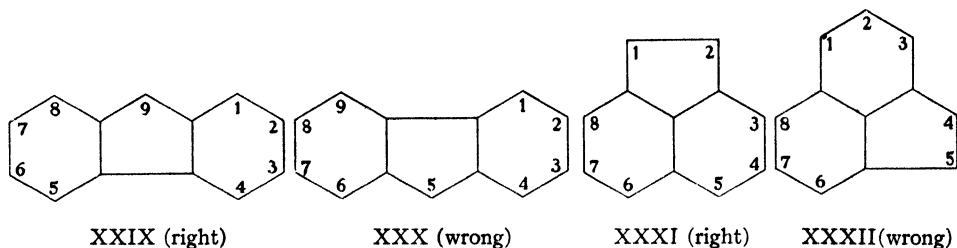


XIX (wrong)



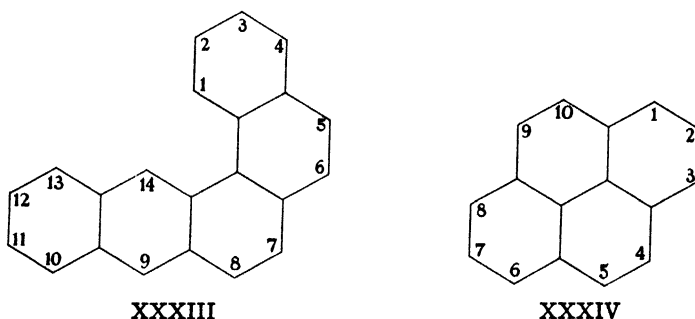
“Rule 10. Of orientations conforming to Rules 6–9, choose the one in which unnumbered carbon atoms follow the lowest numbers possible.

“Examples: In XXIX the unnumbered carbon atoms follow the numbers 4,4,8,9; these are lower than the 4,5,9,9 of XXX. Similarly, the numbers 2,5,8 of XXXI are lower than the 3,5,8 of XXXII.



“Rule 11. Of orientations conforming to Rules 6–10, choose the one that gives to hydrogen atoms the lowest numbers possible.

“Rule 12. Number the oriented formula by beginning with the first free angle of the upper right ring and proceeding clockwise around the entire formula to the beginning, numbering all carbon atoms that are not common to two or more rings.

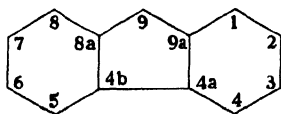


"Note 12. The 'first free angle' is the first angle, not also part of another ring, from which one may proceed clockwise around the ring.

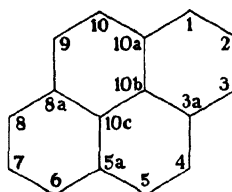
"Note 13. The 'upper right ring' is the highest ring in the formula or, if two or more are equally high, then the ring farthest to the right in the highest row.

"Note 14. Ordinarily, no numbers are needed for carbon atoms that are common to two or more rings. When such a need does arise, it is recommended that they be numbered by adding *a* (or *b*, *c*, etc., in case of a succession of them) to the number of the position just preceding in the clockwise order; interior carbon atoms are considered to follow the highest number."

Examples:

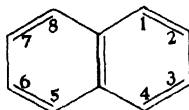


XXXV

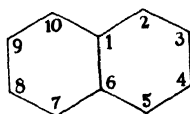


XXXVI

Author's note: In numbering the alicyclic series, the system is not changed entirely but is slightly different for saturated fused ring systems than that generally accepted for aromatic hydrocarbons. For example: Naphthalene is numbered thus:



while the decahydronaphthalene, [0,4,4]-bicyclodecane is numbered thus:



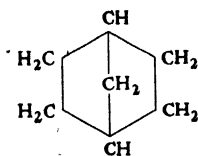
This method is in line with that in general usage for the fused rings of the following type:



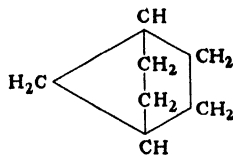
"C. THE SYSTEM DOES NOT BELONG TO CLASSES A AND B, AND DOES NOT CONTAIN FREE SPIRO UNIONS

"I. The system consists of two rings only, separated by either an atomic bridge or a valence bridge.

"Note 16. Formulas of systems belonging to Class C, I must be drawn so that the bridge contains as few members as possible.

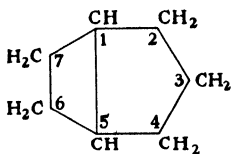
Examples:

XXXVII (right)

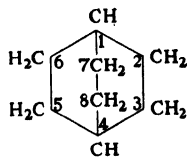


XXXVIII (wrong)

"Rule 13. Starting with one end of the bridge as 1, number around the longer way to the other end of the bridge, then on around the shorter way to the beginning and finally, by the shortest path, along the bridge itself if the bridge is atomic. If there are two or more possibilities for the shortest path, choose the shortest path from the highest previous number that will give a decision. Number all ring members.

Examples:

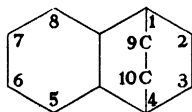
XXXIX



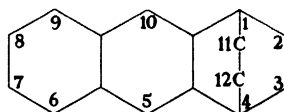
XL

"II. The system contains one or more atomic bridges the removal of which would throw the system into Class B.

"Rule 17. Disregarding the atomic bridges and converting the resulting form to the lowest stage of hydrogenation, number by Rules 6, 7, 10, 11 and 12; then number the bridge members, following the shortest path as in Rule 13.

Examples:

XLIII



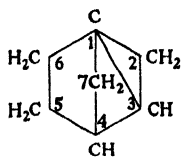
XLIV

"Note 17. The atomic bridges in Class C, II must contain as few members as possible.

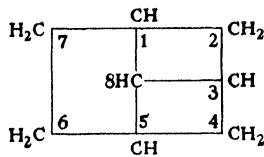
"III. The system does not belong under I or II.

"Note 18. The systems of Class C, III contain two or more bridges, either atomic or valence. Special care must be taken to draw the formula so that the bridges shall be as simple and of as few members as possible. A branched bridge is regarded as consisting of a main bridge and one or more branch bridges. A branched bridge should be preferred to crossed bridges even though it contain more members (see XLVII and XLVIII), but in no case should the chain o

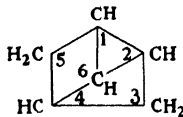
bridge members between the two bridge ends be greater than either of the outside chains between the same points. In difficult cases it may be advisable to construct a spatial model so as to decide upon the most natural plane formula.



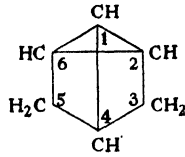
XLV



XLVI



XLVII



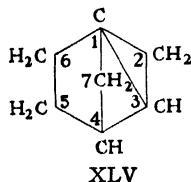
XLVIII

"Rule 18. Select as the chief bridge (one end of which becomes Position 1) the one having the most members or, if two have an equally large number of members, the one that divides the outside ring more symmetrically; number as in Rule 13; then number any remaining bridge members by the shortest path.

Examples: See XLV, XLVI, XLVII.

"Rule 19. Of two or more numberings conforming to Rule 18, choose the one that gives the lowest numbers to the ends of the other bridges.

Example:



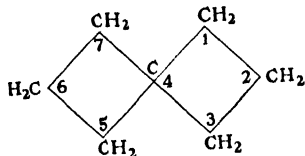
XLV

"D. THE SYSTEM CONTAINS ONE OR MORE FREE SPIRO UNIONS

I. The system contains spiro unions only.

"Rule 21. Beginning with a ring member next to the spiro atom in the right end ring, number clockwise around the end ring and on around the entire formula. Number all ring members.

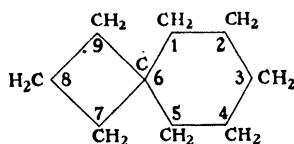
Example:



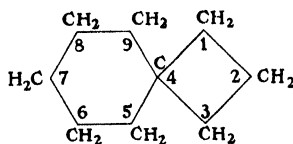
XLIX

"Rule 22. Of two or more numberings conforming to Rule 21, choose the one that gives the lowest numbers to spiro atoms."

Examples:

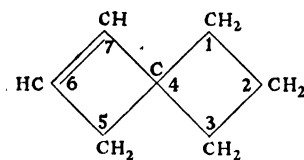


Wrong

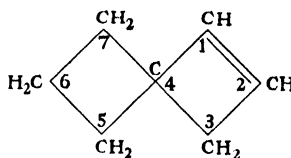


Right

Author's note: The placing of the double bond has been changed to the one position in this study rather than the six position as is shown in the following. See Chemical Abstracts:



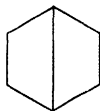
Wrong



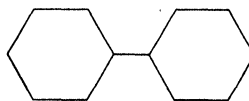
Right

C. Definition of Bi and Di in Alicyclic Nomenclature

In the nomenclature herein adopted for the alicyclic hydrocarbons it has been necessary to differentiate the fused (shared) or "endocyclic" from the "exocyclic" ring structures. The distinction between these two systems has been accomplished by *arbitrarily* using the prefix *bi* for hydrocarbons of fused rings or endocyclic type, and the prefix *di* for the separated rings or exocyclic type—as illustrated in the examples:

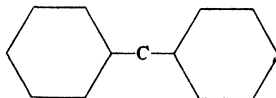


[0,2,2]-Bicyclohexane

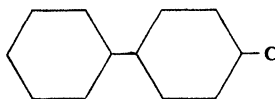


Dicyclohexyl

The prefix *di* is also used to denote two separate rings joined to the same carbon atom as illustrated in dicyclohexylmethane



and *di* is also used as in dicyclohexylmethane



In the present study the latter two cases are distinguished by the suffix *-yl* in the case in which the two rings are joined to each other directly.

In order to name the bicyclic compounds a unique system of numbering in relation to the rest of the compounds had to be adopted. For such compounds as the following



there was no method in existence which properly accounted for the fused ring state of the molecule. The system in use at present was proposed by Baeyer and the following conventions adopted: in the preceding formula the method of naming is as follows [1,2,2]-bicycloheptane. The first number considered is the number of carbons on the bridge, the next two numbers denote the number of carbons on either side of the bridge; the first (according to our own method) denotes the number of carbons to the right of the bridge and the second, the number to the left.

The foregoing usage of the prefixes bi and di will be followed consistently in this study.

D. Supplementary Nomenclature Considerations

The foregoing Geneva nomenclature rules are not sufficiently extensive to cover some complex polycyclic compounds and therefore will be supplemented by nomenclature taken from Beilstein¹⁴ based upon the work of Baeyer, Stelzner, and Kuh.

The generalizations relating to the 2 and 3 ring, fused and condensed ring systems are given:

"1. Polycyclic hydrocarbons with an indirect linkage of single rings.

"The systematic naming of these hydrocarbons and derivatives is more easily accomplished if the following combinations are named with reference to the straight-chain hydrocarbons present in the compound.

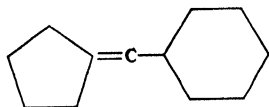
Examples:

$C_6H_{11} \cdot CH_2 \cdot C_6H_{11}$ Dicyclohexylmethane

$C_6H_{11} \cdot CH \cdot C_6H_{11}$ Tricyclohexylmethane

C_6H_{11}

$C_6H_{11} \cdot CH_2 \cdot CH_2 \cdot C_6H_{11}$ 1,2-Dicyclohexylethane

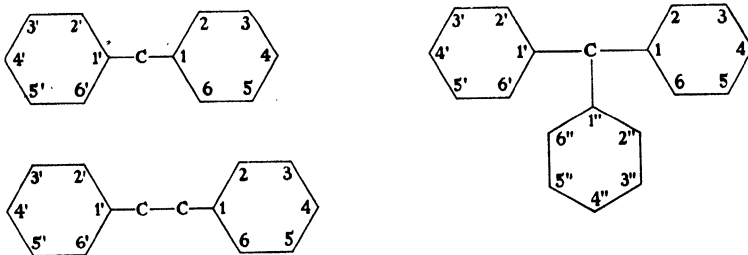


Cyclopentylidenecyclohexylmethane

"Proceeding with the aforementioned names to designate the homologues, substitution products, etc., the following numbering system is proposed.

(14) Beilstein, Vol. V, pp. 8-14, 1922

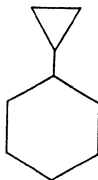
Examples:



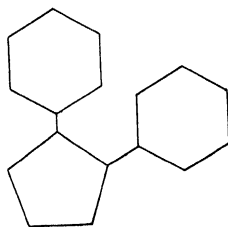
"2. Polycyclic hydrocarbons with directly connected ring structures. A general designation of this type of compound might be 'diphenyloid' since the original structure of this type was diphenyl.

"A method adopted for the naming of individual representatives of the double ring system is the use of one hydrocarbon ring as a stem and the other as the substituent.

Examples:

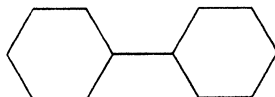


Cyclopropylcyclohexane



1,2-Dicyclohexylcyclopentane

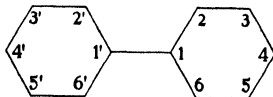
"The following rule is applied for both aromatic and alicyclic structures. The handling of the double nuclear symmetrical ring system allows two methods of naming, either as a double radical or according to the method previously shown. The literature contains both dicyclohexyl and bicyclohexyl for the following formula:"



Dicyclohexyl, bicyclohexyl, or cyclohexyl-cyclohexane

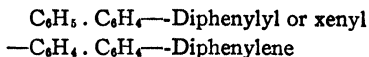
Author's note: In our study of formulae of this type, the term dicyclic has been used to differentiate these hydrocarbons from those with internal rings.

Beilstein states that: "The numbering is shown as follows:



The nomenclature of diphenyl and its homologues and unsymmetrical derivatives is based on diphenyl, as for example, 4,4'-dimethyldiphenyl, or as another example of nomenclature for the same compound, *p,p'*-ditolyl.

"For naming a univalent and a bivalent radical the diphenyl radicals are shown as follows:



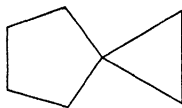
"Where the formulae are employed without the positions being designated, the diphenyl radical is understood with the one free valence at the 4 position or para to the connecting bond. The diphenylene structure has the valence at the 2 and 2' or the ortho positions.

C. Polycyclic Hydrocarbons with Internal Rings

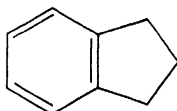
"Polynuclear ring systems that are of known structure contain fixed structures within the single ring. These are considered as condensed rings. The polynuclear ring systems characterized by having more than one ring in their fixed ring structure are considered as two rings fused together.

"One considers as condensed rings, polynuclear ring systems which are characterized by having more than one ring in their fixed ring structure. The single rings are, to a certain degree, fused together. Ring condensation of two single-rings present the following possibilities:

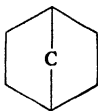
1. One carbon atom is common to both rings. The spiro configuration is the case where one carbon is shared by both rings.



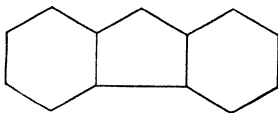
2. Two adjacent carbons are common to both rings.



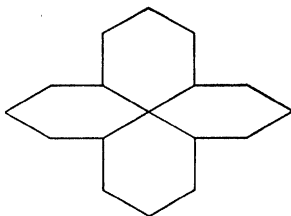
3. There are more than two carbon atoms common to both rings.



"Condensed ring systems which can be split into more than two single rings, can come about if the above manner of condensation is repeated so that no one ring member is common to more than two single rings.

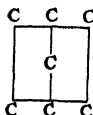


4. Certain carbon atoms are common to more than two single rings.

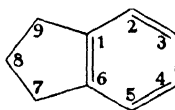


"For the derivation of systematic names in these different classes of condensed systems there are no fundamental rules carried over into general use which are extensively applicable. The attempts which have been made in this direction and which have yielded good results for certain parts show that the problem is most difficult and that there is small chance of reaching a solution which combines clarity of nomenclature with satisfactory simplicity. Thus is justified the historic procedure which has been developed and by which each polynuclear system whose significance extends through a number of known derivatives, is covered with a characteristic name. Nevertheless the necessity for the systematic or 'half systematic' nomenclature of the few polynuclear rings worked on remains persistent. This was shown especially in the years during which the literature search for this handbook (Beilstein) was carried on and in the different attempts at completion of preliminary principles and their extension. In a comprehensive way (1922) during a similar consideration of isocyclic and heterocyclic compounds, Stelzner and Kuh in the introduction to Vol. III of 'Literatur-Register der Organischen Chemie' attained the object for the basis of this book (Beilstein). Since this work is closely correlated with our book, the naming of compounds obtained according to the suggestion of Stelzner and Kuh, were, in suitable cases, used beside that in the original literature or according to established custom and are quoted with structural names. The following explanations are limited essentially to the prevailing practice of 1910.

"A proposal of Baeyer frequently followed in the literature can be applied to the bicyclic systems of cases 2 and 3. It suggests that one unite in the name, the total number of carbon atoms in the ring with the prefix bicyclo; this specifies by means of figures how many carbon atoms on each of the bridges lie between the two tertiary carbon atoms found at the place of ring branching. Thus one arrives at the name bicyclo-[1,2,2]-heptane for the hydrocarbon shown in the formula.

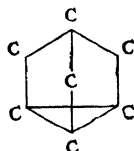


The numbering begins at a tertiary carbon turning the ring branching first in the wider then in the narrower orbit and going over finally to the carbon atom of the shortest bridge. Accordingly, the unsaturated hydrocarbon of formula



may be designated as bicyclo-[0,4,3]-nonatriene-1(6),2,4."

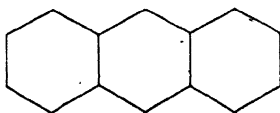
Up to the present time (August 1939) there has been no systematic method entirely satisfactory for naming the tricyclic groupings both of endo and exocyclic types of hydrocarbons. However, it is possible to apply in a limited way, the methods from bicyclic nomenclature to the naming of the triendocyclic compounds, as for example:



1,4-Endomethylene-[0,1,3]^{3,4}-bicyclohexane

The common name for such a configuration is apocyclene or tricyclene, which is, as usual, unconnected with the structure. The superscripts shown in the formula for bicyclo compounds, as (0,4,4)^{1,6} both in the unquoted part of the introduction and in the section on bicyclanes and bicyclenes are used to denote the positions at which the fusion of the inner bond is located.

The other tricyclic groupings have been difficult to designate in a systematic manner and therefore have retained their common name, for example:



Perhydroanthracene, or as a Geneva system name: 2,3-Cyclohexano-[0,4,4]^{1,6} bicyclodecane.

The method of naming exocyclic tricyclo compounds is to use the prefix tricyclo with the suffix denoting the number of carbon atoms in the individual ring. This leaves no method for differentiating the endotricyclic compounds by use of a different prefix meaning three as in the relation of bi and di as adopted in this study.

For compounds of higher ring structure, the application of the Geneva system would be too cumbersome and tend toward ambiguity, although the hydrocarbons can be named as shown in the preceding examples.

The common names of the hydrocarbons have been included with the systematic ones, and an index for all of the common names will appear in the fourth volume of this work.

4. Critical Evaluation of the Data and Calculation of the Most Probable Values

A. INTRODUCTION

The problem of critically evaluating the experimental data has been somewhat complicated by investigators who have not reported probable errors of their physical constants; nor have they given sufficient details of their experiments to enable one to evaluate their constants with the degree of accuracy comparable to Volume I on aliphatic hydrocarbons. Since there is no one method by which the probable errors can be calculated from the alicyclic constants, an estimate has been made of the probable degree of reliability by consideration of the mode of synthesis, purification, and measurements.

In general, the physical constants of members of the alicyclic series are less reliable than those of the aliphatic series. The specific gravities and indices of refraction of aliphatic hydrocarbons are, on the average, reliable to one or two parts in 10,000; in contrast, the alicyclic variations are from two to four parts in 1,000. A striking example of inconsistency in the data is found in the data for 1-methylcyclohexene-1. There are data attributed to this compound which agree more closely with the more reliable physical constants of 3- and 4-methylcyclohexene-1. The experimenters have probably overlooked the possibility of isomerization of the compound during identification and measurement of the constants. This type of error may occur frequently but cannot be detected in this study because of a scarcity of accurate data for the pure compounds.

A discussion of the methods used in evaluating the melting points, boiling points, specific gravities, and refraction indices are given as follows:

B. MELTING POINTS

There are fewer data for the melting points of alicyclic hydrocarbons than for any of the other physical constants collected. Less than twenty per cent of the compounds have melting point data. A critical analysis of the data is impractical at this time because in most cases only one or two values are given for any one compound.

C. BOILING POINTS

For each hydrocarbon the boiling point data are listed in order of decreasing pressure. The pressure in millimeters corresponding to each boiling point is given

unless this pressure is 760 mm. in which case it is omitted. The value given in bold-face type for each hydrocarbon is a weighted average of the experimental values given at 760 mm.

There are more values for specific gravity of the alicyclic hydrocarbons than for either the melting point or boiling point values. The specific gravity may be determined more accurately than either the melting or the boiling point.

D. SPECIFIC GRAVITY

In determining the temperature coefficients of specific gravity, it is assumed that the variation of specific gravity with temperature may be expressed by the equation:

$$D_t^t = D_{t_0}^{t_0} + a(t - t_0) + b(t - t_0)^2, \quad (1)$$

in which D_t^t is the specific gravity of the substance at the temperature t , $D_{t_0}^{t_0}$ the specific gravity at some constant temperature t_0 , and a and b are constants to be evaluated.

The constants $D_{t_0}^{t_0}$ (t_0 usually being 20°), a , and b were determined by the method of least squares. If the data are for the same temperature, the method of least squares is equivalent to taking the weighted average of these data.

The temperature coefficient of specific gravity, *i.e.*, the derivative of D_t^t with respect to t , obtained from equation (1) is

$$\frac{dD}{dt} = a + 2b(t - t_0) \quad (2)$$

$$= a \left[1 + \frac{2b}{a}(t - t_0) \right] \quad (3)$$

In all but a few cases equation (1) represents a degree of accuracy unjustified by the experimental data. Under these circumstances equation (1) degenerates into

$$D_t^t = D_{t_0}^{t_0} + a(t - t_0) \quad (4)$$

and equation (3) to

$$\frac{dD}{dt} = a \quad (5)$$

Equation (4) reproduces the data to within three or four units in the third decimal place or about one part in 200.

The adopted value of $D_{t_0}^{t_0}$ is given in the specific gravity column in bold-face type, the last figure of which is usually given in small type, *e.g.*, 0.0812₈. This signifies that the last figure is to be used only in calculating specific gravities at temperatures other than 20° . Equation (3) or (5) is given in the additional data column.

When values in the form $D_{t_1}^{t_1}$ are reported, t_1 being different from 4° , the values of $D_{t_1}^{t_1}$ are calculated by means of the formula

$$D_{t_1}^{t_1} (\text{hydrocarbon}) = D_{t_1}^{t_1} (\text{hydrocarbon}) \times D_{t_1}^{t_1} (\text{water}).$$

$D_1^{t_2}$ is numerically equal to the density at t_2 in c.g.s. units when t_1 refers to the density of water at 4° .

The specific gravity values for each compound are listed in order of decreasing temperature. When the specific gravity was determined at 20° , this temperature was not recorded since the heading is given as D_1^{20} . If the specific gravity is referred to water at a temperature other than 4° , this fact is indicated by $D_1^{t_2}$ following the specific gravity value (t_1 and t_2 being expressed numerically).

E. INDEX OF REFRACTION

For each compound the indices of refraction are given for the H_α , H_β , H_γ , Na_D , He_r , He_y , and He_g lines wherever data permit. The subscripts r, y, and g on the He lines signify red, yellow, and green respectively. The temperature of the index of refraction measurement is indicated by a superscript on the symbol designating the line. Thus $1.42565, n_H^{20}$ signifies that the value of the index of refraction at 20° C. for the H line is 1.42565.

The wave lengths of the above-mentioned lines are given below.

TABLE I—Wave Lengths of the Principal Lines Used in Index of Refraction Measurements

<i>Line</i>	<i>Wave Length, Å</i>
He_r	6678
H_α	6563
Na_D	5893
He_y	5876
He_g	5016
H_β	4861
H_γ	4341

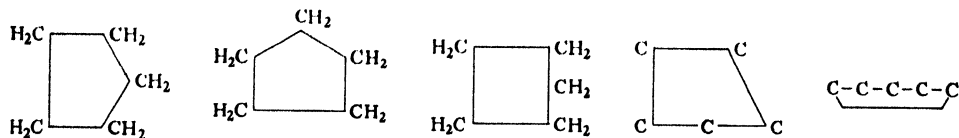
The temperature coefficients of the index of refraction are evaluated by the same method used for specific gravity. The changes with temperature are smaller but of the same order of magnitude as those of specific gravity. The value of $n_D^{t_0}$ ($t_0 = 20^\circ$ whenever possible) is given in the index of refraction column in bold-face type, and that of the temperature coefficient in the additional data column. The values of the indices of refraction are referred to the sodium *D* line unless otherwise indicated and are tabulated in a manner similar to those for specific gravity.

5. Description of the Tables

A. STRUCTURAL FORMULAE

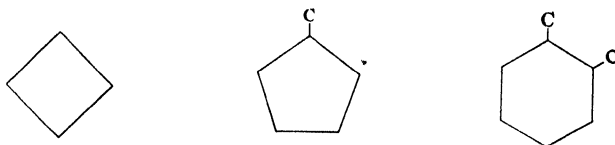
In writing the structure of the carbon skeleton of an alicyclic hydrocarbon, attempts are generally made to show only the number of carbon atoms in the ring. There is no intention to imply literal geometrical relation in the drawings. As a

result, a lack of uniformity occurs in writing the carbon skeletons of ring compounds. For example, cyclopentane is shown in a recent textbook of organic chemistry as follows:



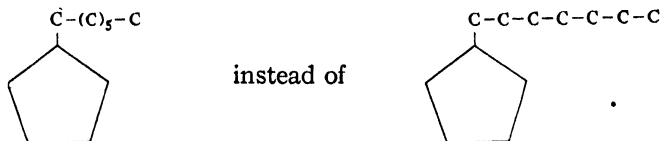
In the present work an attempt is made to depict the carbon rings so as to correspond as closely as possible to the configuration of the carbon nuclei as discussed in an earlier section.

For each hydrocarbon, only those carbon atoms not part of a ring are explicitly written, except for shared rings as noted later. The monocyclic rings from cyclopropane to cyclooctane inclusive are simply depicted as regular polygons. Thus, cyclobutane, methylcyclopentane, and 1,2-dimethylcyclohexane are written as follows:



o-Xylene is often written in the same way as 1,2-dimethylcyclohexane above. However, this should result in no confusion to the reader inasmuch as compounds containing aromatic rings are not reported in the present volume. In volume III the aromatic rings will be distinguished from the alicyclics by the use of double bonds corresponding to any one of the Kekule-type structures.

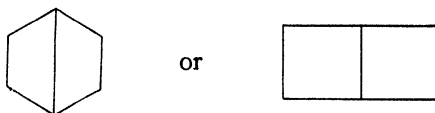
Aliphatic side chains containing five or more carbon atoms in a straight chain will usually be written in an abbreviated manner. Thus, heptylcyclopentane will be written as




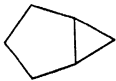
If the aliphatic side chains on the rings are *normal*, i.e., unbranched, the letter *n* has been omitted before the name. Thus butylcyclopentane will signify *n*-butyl cyclopentane.

As has been explained, the structures of many ring compounds, particularly those containing shared rings, are not known with certainty. As a consequence, the structural formulae have been reported more than one way in the literature

even when the attempt is made to show the geometrical configuration; *i.e.*, [0,2,2]-bicyclohexane is shown as either

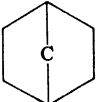


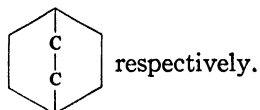
Although it is more frequently found in the literature in the former way, we shall write it in the latter way (*i.e.*, as two squares) because it has been shown in a previous section that this is somewhat nearer the actual configuration.

[0,1,3]-Bicyclohexane will be written in the form usually found in the literature, *i.e.*, as  even though it would be more correct to write it as . The

latter is never given and might result in some confusion if it were adopted here.

In shared rings having three or more carbon atoms in common, all the shared carbon atoms except the terminal ones will be written explicitly. Thus, [1,2,2]-

bicycloheptane and [2,2,2]-bicyclooctane will be written as  and as



In polycyclic compounds containing more than two shared rings, the foregoing conventions are not strictly adhered to.



B. INTRODUCTION TO TABLES



The tables contain the experimental data on melting point, boiling point, specific gravity, and index of refraction. The bold-face figures are weighted statistical averages of all the values collated to March, 1939.


II. CYCLANES OR CYCLOPARAFFINS

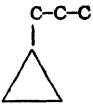
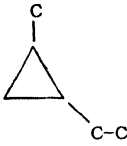
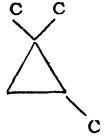
1. Cyclanes with alkyl substitutions C_nH_{2n}
2. Cyclanes with an alkenyl or olefin substitution C_nH_{2n-2}
3. Cyclanes with two alkenyl or olefin substitutions C_nH_{2n-4}
4. Cyclanes with an alkadienyl or diolefin substitution C_nH_{2n-4}
5. Cyclanes with an alkynyl or acetylene substitution C_nH_{2n-4}
6. Cyclanes with a cycloalkenyl or cycloolefin substitution C_nH_{2n-4}
7. Cyclanes with a bicyclenyl or bicycloolefin substitution C_nH_{2n-6}

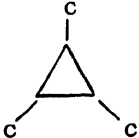
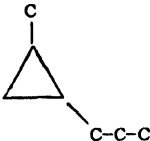
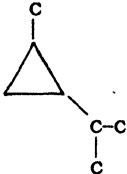
1. CYCLANES WITH AN ALKYL OR PARAFFIN SUBSTITUTION

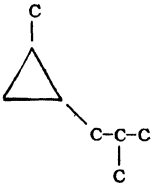
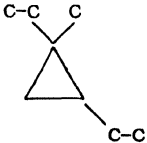
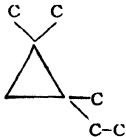
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclopropane 	-126.9 -127 ²⁴ -126 ^{24a}	-33 -32.6 to -33.6 ¹⁴ -32.89 ¹¹ -32.9 ⁸ -32.89 ¹ @ 755.9mm -34.5 ²⁴ @ 750mm	0.688, ⁸ @ -40° 0.6807 ⁸ @ -32.75° 0.6886 ⁸ @ -40° 0.720 ²⁴ @ -79° 0.7352 ⁸ @ -80°	1.377, ¹ @ -40° 1.3726 ⁷ @ -32.75° 1.3769 ⁷ @ -40° 1.3799 ⁸ @ -42.5° 1.3790 ²⁰ @ -42.8° 1.3898 ²⁰ @ -60.0° 1.3971 ²⁰ @ -71.2° 1.4024 ⁷ @ -80°	$\frac{dD}{dt} = -0.00116/^\circ\text{C.}$ (-80° to -35°) $\frac{dn}{dt} = -0.00064/^\circ\text{C.}$ (-80° to -35°)
C₄H₈ Methylcyclopropane 	4 to 5 ⁸		0.6760 ⁸ D_0^{-8} 0.6912 ⁸ D_0^{-20}		

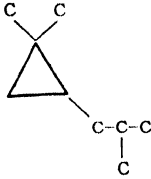
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Ethylcyclopropane 		34.5 35.75 ¹⁶ @ 765mm 36 to 36.5 ²³ 34.5 to 35 ^{4,24b} 36.5 to 37 ²² @ 755mm	0.677₆ 0.6784 ^{4,24b} 0.6764 ¹⁶ 0.6832 ²³ 0.6866 ²² @ 18.25° 0.6975 ^{4,24a} @ 0° 0.7055 ²² @ 0°	1.379 1.3789 ¹⁶ 1.3791 ²³ 1.37973 ²² 1.3780 ^{24b}	$\frac{dD}{dt} = -0.000100/^\circ\text{C.}$ (0° to 20°)
1,1-Dimethyl- cyclopropane 		21 ^{9,10}	0.6604 ¹⁰ 0.6619 ⁹ @ 17°	1.3659 ¹⁰ 1.36869 ⁹ @ 17°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2-Dimethyl- cyclopropane low boiling  high boiling		32.4 to 33.2 ²¹ @ 761mm 28.8 to 29 ² @ 758.9mm	0.6754 ²¹ @ 22° 0.6769 ²	1.37129 ² 1.38023 ² n _H ²⁰ _a 1.38702 ² n _H ²⁰ _β 1.39109 ² n _H ²⁰ _γ	
		37.2 to 37.4 ² @ 755.5mm	0.6928 ² 0.6985 ² @ 0° 0.71325 ² @ 0°	1.38223 ² 1.36941 ² n _H ²⁰ _a 1.37617 ² n _H ²⁰ _β 1.37997 ² n _H ²⁰ _γ 1.37493 ²¹ n _H ^{19.6} _a 1.38209 ²¹ n _H ^{19.6} _β 1.38598 ²¹ n _H ^{19.6} _γ	
(Probably <i>cis-trans</i> mixture)		32 to 33 ²⁵	0.6806 ²⁵ 0.7025 ²⁵ @ 0°	1.3763 ²⁵ 1.3774 ²⁵ @ 18° 1.3787 ²⁵ @ 16° 1.3798 ²⁵ @ 14° 1.3813 ²⁵ @ 12° 1.3823 ²⁵ @ 10°	



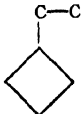
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Propylcyclopropane 		68.5 ³	0.7121 ³ @ 16.7°	1.3957 ³ @ 18° 1.3963 ³ @ 16.7°	
1-Methyl-2-ethyl- cyclopropane 		64.9 to 65.9 ¹⁷ 63.9 to 64.9 ^{17,18}	0.6961 ^{17,18} @ 21° 0.6959 ¹⁷ 0.6960 ¹⁷	1.3876 ¹⁷ @ 21° 1.3874 ¹⁸ @ 21° 1.3874 ¹⁷ 1.3880 ¹⁷	
1,1,2-Trimethyl- cyclopropane 		57 59 to 60 ²¹ @ 768mm 59 to 60 ⁴ 52.8 ¹² @ 756mm 52.5 ¹² @ 752mm 56 to 57 ²⁶ @ 750mm	0.681, 0.6949 ¹² D ₄ ²⁰ 0.6822 ²⁶ @ 19.5° 0.6888 ^{4,21} @ 15.3°	1.386, 1.3866 ¹² 1.3848 ²⁶ @ 19.5° 1.3896 ²¹ @ 14.5° 1.38738 ²¹ n _{H_a} ^{14.6} 1.39505 ²¹ n _{H_β} ^{14.6} 1.39975 ²¹ n _{H_γ} ^{14.6}	

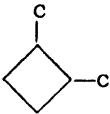
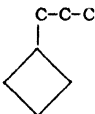
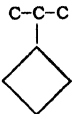
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2,3-Trimethyl- cyclopropane 		65 to 67 ²⁶ @ 755mm	0.6946 ²⁶ @ 18°	1.3945 ²⁶	
C₇H₁₄ 1-Methyl-2-propyl- cyclopropane 		92 to 93 ^{17,19}	0.7206 ^{17,19} @ 18°	1.4003 ^{17,19} @ 18°	
1-Methyl-2-isopropyl- cyclopropane 		81 ¹³ @ 748mm	0.7102 ¹³ D ₀ ²⁰	1.3927 ¹³	

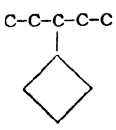
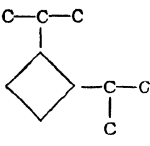
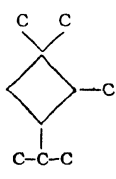
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-2-(2-methylpropyl) cyclopropane 		109.5 to 110.5 ^{13, 25a}	0.7403 ^{13, 25a}	1.4088 ^{13, 25a}	
1-Methyl-1,2-diethylcyclopropane 		108 to 109 ^{25a}	0.7381 ^{25a}	1.4102 ^{25a}	
1,1,2-Trimethyl-2-ethylcyclopropane 		103.5 to 104.5 ¹⁷	0.7418 ¹⁷ @ 20.4°	1.4129 ¹⁷ @ 20.4°	

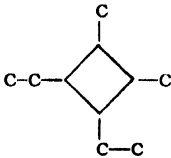
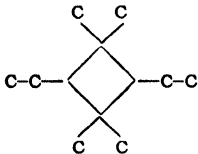
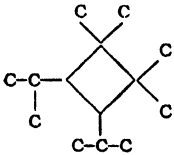
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,1-Dimethyl-2-(2-methylpropyl)-cyclopropane 		125 to 126 ¹¹	0.7187 ¹⁸ <i>D</i> ₄ ²⁰ 0.7347 ¹⁸ <i>D</i> ₄ ⁰	1.4032 ¹⁸	

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Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclobutane 	-80 ¹⁸	11 to 12 ¹⁶	0.7038 ¹⁶ @ 0° 0.7185 ¹⁶ @ -5°	1.37520 ¹⁶ @ 0°	
C₄H₁₀ Methylcyclobutane 		38.6 39 to 42 ^{1,2} 36.3 ⁴ 34 to 35 ¹⁹ 36 to 36.5 ¹³ @ 755mm 35 to 36 ³ @ 753mm	0.6931 0.6931 ³ 0.6784 ¹⁹ 0.6950 ^{3,13} @ 18° 0.6976 ³ @ 15° 0.7118 ¹³ @ 0° 0.7120 ⁴ @ 0° 0.7135 ³ @ 0° 0.6975 ¹⁹ @ 0°	1.3837 1.3780 ¹⁹ 1.3836 ³ 1.3850 ⁴ 1.3846 ³ @ 18° 1.38473 ¹³ @ 18° 1.386 ³ @ 15°	$\frac{dD}{dt} = -0.000946/^\circ\text{C.}$ (0° to 20°) $\frac{dn}{dt} = -0.00048/^\circ\text{C.}$ (15° to 20°)
C₄H₁₂ Ethylcyclobutane 	-143.2 ¹⁴	72.2 to 72.5 ¹⁷ 70.7 ¹⁴ 70 ⁶ @ 754mm	0.7450 0.7450 ¹⁷ 0.7284 ⁶ D_4^{20} 0.7540 ¹⁷ @ 10° 0.7461 ⁶ D_4^0	1.402 1.4004 ⁶ 1.4023 ¹⁴ 1.4080 ¹⁷ @ 19.5° 1.4032 ⁶ @ 15°	$\frac{dD}{dt} = -0.00090/^\circ\text{C.}$ (10° to 20°)

<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
1,2-Dimethyl- cyclobutane 		68 to 70 ²⁰ @ 740mm	0.7122 ²⁰	1.3988 ²⁰	
C₇H₁₄ Propylcyclobutane 		99 to 100 ¹⁸ @ 736.2mm	0.7440 ¹⁸ @ 19°	1.4119 ¹⁸ @ 19°	
Isopropylcyclobutane 		90.5 to 91.5 ⁵ @ 750mm	0.7464 ⁵ @ 14.5°	1.4096 ⁵ @ 19° 1.4125 ⁵ @ 14.5°	

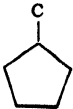
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Cyclobutylpentane 		151 to 152 °	0.7945 ° @ 19°	1.4334 ° @ 19°	
C₁₀H₂₀ 1,2-Diisopropyl- cyclobutane 		157 to 158.5 °	0.7755 ° 0.7901 ° @ 0°	1.42787 ° 1.42565 ° n _D ²⁰ _a 1.43316 ° n _D ²⁰ _β 1.43755 ° n _D ²⁰ _γ	
1,1,2-Trimethyl-3- isopropylcyclobutane 		145 to 146.5 °	0.7598 ° 0.7744 ° @ 0°	1.41997 ° 1.41781 ° n _D ²⁰ _a 1.42527 ° n _D ²⁰ _β 1.42980 ° n _D ²⁰ _γ	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2-Dimethyl-3,4-diethylcyclobutane 		155 to 156 ¹¹	0.7729 ¹¹	1.42447 ¹¹ 1.42193 ¹¹ n _{H_a} ²⁰ 1.42950 ¹¹ n _{H_β} ²⁰ 1.43377 ¹¹ n _{H_γ} ²⁰	
C₁₂H₂₄ 1,1,3,3-Tetramethyl-2,4-diethylcyclobutane 		124 to 125 ¹⁵			
C₁₄H₂₈ 1,1,2,2-Tetramethyl-3,4-diisopropylcyclobutane 		106 to 107 ¹² @ 27mm	0.8035 ¹² @ 17° 0.8181 ¹² @ 0°	1.44580 ¹² @ 17°	

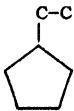
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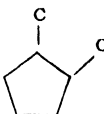
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclopentane 	-94.4	49.3₃	0.7460	1.4068₂	$\frac{dD}{dt} = -0.000949/^\circ\text{C.}$ (0° to 30°)
	-94.1 ³⁴	49.5 ³⁴	0.73572 ⁶⁰	1.4057 ⁷³	
	-94.3 ⁵⁸	@ 767mm	@ 30°	@ 25.5°	$\frac{dn}{dt} = -0.000484/^\circ\text{C.}$ (10° to 25°)
	-94.8 ⁴	48.4 to 48.6 ⁶¹	0.7506 ⁶⁴	1.4061 ⁶²	
		@ 763mm	@ 20.5°	@ 21.8°	
		50.25 to	0.7543 ²¹	1.4039 ⁶⁴	
		50.75 ⁶⁴	@ 20.1°	@ 20.5	
		49.5 ¹⁰	0.7447 ⁵⁴	1.4060 ³¹	
		49.4 to	0.7457 ^{19,25}	1.4065 ⁵⁸	
		49.5 ^{19,25}	0.7471 ⁶¹	1.40672 ⁶¹	
		49.37 ⁵⁹	0.7510 ¹⁸	1.4070 ^{19,25}	
		49.35 to	0.7531 ³¹	1.4075 ⁶⁴	
		49.40 ⁴	0.7491 ⁶¹	1.40910 ⁶⁰	
		49.35 ¹²	@ 17.5°	@ 15°	
		49.30 ⁶⁰	0.7494 ⁶¹	1.4094 ⁴	
		49.2 ⁵⁸	@ 17.1°	@ 15°	
		49 to 51 ⁷³	0.7490 ⁷²	1.4101 ⁷²	
		49.0 ²⁰	@ 15°	@ 15°	
		49 ^{28,29,30}	0.7498 ^{19,25}	1.4101 ⁵²	
		@ 15°	@ 15°	@ 14.7°	
		48.5 ³¹	0.750 ¹⁰	1.4100 ²⁸	
		50.0 ¹⁸	@ 15°	@ 13.5°	
		@ 756mm	0.7503 ¹²	1.4321 ⁵²	
		48.5 to 51 ⁷²	@ 15°	@ -26.8°	
		@ 748mm	0.75033 ⁶⁰	1.40464 ²¹	
			@ 15°	n _{H_a} ^{20,1}	
			0.7505 ⁴	1.40464 ⁶¹	
			@ 15°	n _{H_a} ^{20,0}	
			0.7500 ²³	1.40383 ¹⁸	
			@ 14.7°	n _{H_a} ²⁰	
			0.754 ⁵⁵	1.40702 ⁶⁰	
			@ 14.7°	n _{H_a} ¹⁵	
			0.7502 ²⁸	1.4074 ⁴	
			D _{13.5} ^{13.5}	n _{H_a} ¹⁵	
			0.7517 ²⁰	1.40770 ²⁸	
			@ 12.7°	n _{H_a} ^{14,7}	
			0.7645 ⁴	1.41173 ²¹	
			@ 0°	n _{H_β} ^{20,1}	
			0.7646 ¹²	1.41166 ⁶¹	
			@ 0°	n _{H_β} ^{20,0}	
			0.76498 ⁶⁰		
			@ 0°		

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclopentane (Continued)				1.41126 ¹⁸	
				n _{H_β} ²⁰	
				1.41417 ⁶⁰	
				n _{H_β} ¹⁵	
				1.4145 ⁴	
				n _{H_β} ¹⁵	
				1.41481 ²³	
				n _{H_β} ^{14.7}	
				1.41589 ²¹	
				n _{H_γ} ^{20.1}	
				1.41520 ⁶¹	
				n _{H_γ} ^{20.0}	
				1.41536 ¹⁸	
				n _{H_γ} ²⁰	
				1.4185 ⁴	
				n _{H_γ} ¹⁵	
				1.41891 ²³	
				n _{H_γ} ^{14.7}	
				1.40609 ¹⁸	
				n _{H_δ} ²⁰	
				1.40981 ²³	
				n _{H_δ} ^{14.7}	
				1.41318 ⁶⁰	
				n _{H_δ} ¹⁵	
				1.40668 ⁶⁰	
				n _{H_ε} ¹⁵	
				1.41723 ⁶⁰	
				n _{H_ε} ¹⁵	
				1.40927 ⁶⁰	
				n _{H_ε} ¹⁵	

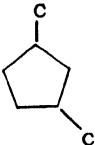
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Methylcyclopentane	-142.2	71.9,	0.7488,	1.4099,	$\frac{dD}{dt} = -0.000916/^{\circ}\text{C.}$ (0° to 40°) $\frac{dn}{dt} = -0.000475/^{\circ}\text{C.}$ (10° to 20°)
	-141.4 ⁷	72 to	0.7293 ⁶¹	1.4088 ⁶⁷	
	-141.9 ³³	72.2 ^{67,68,77}	@ 41.2°	@ 21°	
	-142.4 ⁵⁸	72.00 ⁶⁰	0.7303 ⁶¹	1.4098 ³³	
	-142.7 ⁵⁸	72 ¹⁰	@ 40.2°	1.4099 ^{19,25}	
	-143.0 ⁵⁰	71.9 ^{4,12,19,25,58}	0.73948 ⁶⁰	1.40998 ⁶¹	
		71.8 to 72 ⁴	@ 30°	1.4100 ^{58,80}	
		71.8 ³³	0.7474 ⁶⁷	1.4096 ⁷⁷	
		71.5 to 72.5 ²⁶	@ 21°	@ 19.5°	
		71 to 72.5 ⁷¹	0.7459 ¹⁸	1.4104 ⁶⁵	
		71 to 72 ⁸⁰	0.7487 ³³	@ 18°	
		70 to 72.5 ⁴⁶	0.7496 ^{19,25}	1.4119 ^{71,73}	
		70 to 71 ^{24,47}	0.7510 ⁶¹	@ 15.5°	
		71 to 72 ⁴⁶	0.7508 ⁴⁶	1.41237 ⁶⁰	
		@ 755mm	D _n ²⁰	@ 15°	
		70.0 to 70.5 ¹⁸	0.7488 ⁷⁷	1.4126 ⁴	
		@ 755mm	@ 19.5°	@ 15°	
		71 to 72 ³⁸	0.7515 ⁶¹	1.4111 ²⁸	
		@ 752mm	@ 19.5°	@ 13.5°	
		70.9 to 71.0 ⁶¹	0.7473 ⁶⁵	1.40788 ⁶¹	
		@ 751mm	@ 18°	n _{H_a} ^{20,G}	
		71 to 72.5 ⁷³	0.7505 ⁷³	1.40750 ¹⁸	
		@ 745mm	@ 15.5°	n _{H_a} ²⁰	
		71 ⁷⁷	0.7505 ⁷¹	1.41023 ⁶⁰	
		@ 743mm	@ 15°	n _{H_a} ¹⁵	
		71.5 to 72 ⁴⁶	0.7528 ^{4,12}	1.4104 ⁴	
		@ 742mm	@ 15°	n _{H_a} ¹⁵	
		71.5 to 72.5 ⁶⁵	0.753 ¹⁰	1.41511 ⁶¹	
		@ 740mm	@ 15°	n _{H_β} ^{20,0}	
			0.7530 ⁴	1.41465 ¹⁸	
			@ 15°	m _{H_β} ²⁰	
			0.7533 ¹⁰	1.4176 ⁴	
			@ 15°	n _{H_β} ¹⁵	
			0.7541 ^{19,25}	1.41760 ⁶⁰	
			@ 15°	n _{H_β} ¹⁵	
			0.7562 ⁶¹	1.41824 ⁶¹	
			@ 14.8°	n _{H_γ} ^{20,0}	
			0.7511 ²⁸	1.41868 ¹⁸	
			D _{13.5} ^{13,5}	n _{H_γ} ²⁰	
			0.7666 ^{4,12}		
			@ 0°		

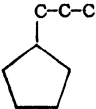
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Methylcyclopentane (Continued)					
			0.76737 ⁶⁰ @ 0°	1.4214 ⁴ $n_{H_\gamma}^{15}$	
			0.76615 ⁴⁶ D_0^0	1.40947 ¹⁸ $n_{H_\delta}^{20}$	
			0.76641 ⁴⁶ D_0^0	1.41649 ⁶⁰ $n_{H_\epsilon}^{15}$	
			0.76829 ⁴⁶ D_0^0	1.40975 ⁶⁰ $n_{H_\epsilon}^{15}$	
				1.42064 ⁶⁰ $n_{H_\epsilon}^{15}$	
				1.41254 ⁶⁰ $n_{H_\epsilon}^{15}$	

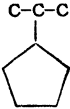
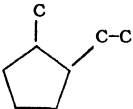
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Ethylcyclopentane 	- 137.9 ⁷	103.4 103.6 ⁵¹ 103 to 103.5 ⁶⁹ 103 to 103.2 ⁷ 103.0 ^{19,25} 103 ⁵² 100.5 to 101.5 ⁷¹ 100.5 to 101.0 ¹⁸ @ 756mm 100.5 to 101.5 ⁷⁸ @ 740mm	0.7657 0.7478 ⁵¹ @ 40° 0.7610 ¹⁸ 0.7632 ⁵¹ 0.7642 ⁶⁹ 0.7654 ^{71,73} 0.7695 ^{19,25} 0.7669 ⁷ @ 19.9° 0.7658 ⁶⁹ @ 18° 0.7736 ^{19,25} @ 15° 0.7711 ⁷ @ 14.9°	1.4197₆ 1.4190 ⁵² @ 21.8° 1.4196 ⁵¹ 1.4201 ^{19,25} 1.4202 ^{71,73} 1.4201 ⁷ @ 19.1° 1.4188 ⁶⁹ @ 18° 1.4222 ⁵² @ 14.7° 1.4269 ⁵² @ 5.8° 1.4425 ⁵² @ - 26.7° 1.41612 ¹⁸ n _{H_a} ²⁰ 1.4179 ⁷ n _{H_a} ^{18,85} 1.42332 ¹⁸ n _{H_β} ²⁰ 1.4253 ⁷ n _{H_β} ^{18,0} 1.42798 ¹⁸ n _{H_γ} ²⁰ 1.41840 ¹⁸ n _{H_δ} ²⁰	$\frac{dD}{dt} = -0.000932^\circ/\text{C.}$ (15° to 40°) $\frac{dn}{dt} = -0.000496/^\circ\text{C.}$ (5° to 25°)

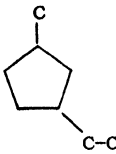

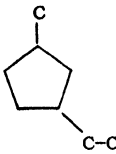
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,1-Dimethyl- cyclopentane 	- 76.4 ° - 77 °	88 ° @ 762mm 87.5 °, ⁴⁴ 86.5 to 87.4 ° 87.8 to 87.9 ° @ 755mm 87.2 to 87.9 ° @ 748mm	0.7523 0.7509 ° 0.7551 ° 0.7546 ° D ₀ ²⁰ 0.7547 ° D ₀ ²⁰ 0.7552 ° D ₀ ²⁰ 0.7590 ° @ 15°	1.4126 1.4122 ° 1.4131 ° 1.4136 °, ⁴⁰ 1.4139 ° 1.4147 ° @ 18° 1.4125 ° n _H ¹⁸ 1.4240 ° n _H ¹⁸	
cis-1,2-Dimethyl- cyclopentane 	- 62 °	99.25 ° 99.23 ° 98.40 ° @ 741mm	0.7723 0.7718 ° 0.77266 ° 0.7764 ° @ 15°	1.42014 ° n _H ²⁰ 1.42748 ° n _H ²⁰ _β 1.43180 ° n _H ²⁰ _γ 1.42202 ° n _H ²⁰ _δ	

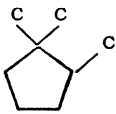
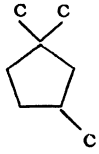
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
trans-1,2-Dimethyl- cyclopentane	- 120 °	91.8 ° 91.78 ¹⁶ 90.95 ° @ 741mm	0.7495 ° 0.75137 ¹⁶ 0.7541 ° @ 15°	1.40934 ° $n_{H_a}^{20}$ 1.41659 ° $n_{H_\beta}^{20}$ 1.42077 ° $n_{H_\gamma}^{20}$ 1.41155 ° $n_{H_\delta}^{20}$ $n_{H_\epsilon}^{20}$	
1,2-Dimethyl- cyclopentane	- 119.0 ⁵⁰	92.7 to 93 ⁴⁰ @ 762mm 95.8 to 97.6 ⁸ 94 to 99 ¹¹ 94 to 98 ^{56,57} 93 to 94 ⁴⁹ 92 to 95 ° 92 to 93 ⁴⁰ @ 758mm 94 to 96 ⁴⁰ @ 754mm	0.7664 ^{56,57} 0.766 ° 0.764 ¹¹ 0.7613 ⁴⁹ 0.7681 ⁸ @ 15° 0.7534 ⁴⁰ D_0^{20} 0.7629 ⁴⁰ D_0^{20} 0.7581 ⁴⁰ $D_0^{18.5}$	1.4187 ^{56,57} 1.417 ¹¹ 1.41745 ⁴⁰ 1.4126 ⁴⁰ 1.4160 ⁴⁰ 1.4150 ⁴⁰ @ 18.5° 1.4166 ^{56,59} $n_{H_a}^{20}$ 1.4241 ^{56,59} $n_{H_\beta}^{20}$ 1.4287 ^{56,59} $n_{H_\gamma}^{20}$	

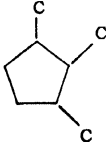
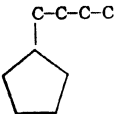
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
d-1,3-Dimethyl- cyclopentane 		90.5 to 91 ⁶⁶ @ 755mm	0.7497 ⁶⁶ @ 18°	1.4110 ⁶⁶ @ 18°	[α] _D ²⁵ = +1.78° ⁶⁶
1,3-Dimethyl- cyclopentane	-136.75 ³ -136.7 ^{59a}	93 ⁶⁵ 90.7 ⁸ 90.68 to 90.80 ³ 90.6 to 90.8 ^{3,5} 90.5 ^{19,25} 94 to 95 ³⁹ @ 755mm 91 to 91.5 ⁶⁶ @ 751mm 90.18 to 90.30 ³ @ 749mm 89.9 to 90.1 ³ @ 744mm 93 ⁷⁸ @ 743mm	0.7410 ⁶⁶ @ 24° 0.7463 ^{19,25} 0.7543 ^{65,78} 0.7562 ³⁹ D _D ²⁰ 0.7456 ^{3,5} @ 19.7° 0.7498 ^{3,5,6} @ 15° 0.7504 ^{19,25} @ 15°	1.4066 ⁶⁶ @ 24° 1.4076 ^{3,5} @ 20.8° 1.4096 ^{19,25} 1.4130 ⁷⁸ 1.4144 ³⁹ 1.4104 ^{3,5} @ 16°	
x,x-Dimethyl- cyclopentane		91 to 94 ¹⁰ 91 to 91.4 ⁷⁹			

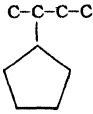
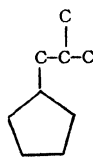
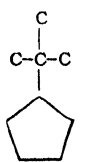
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Propylcyclopentane 	-120.3 ⁷ -121.7 ^{59a}	130.8 131.3 ⁷ to 131.5 130.7 ⁵¹ 130.6 ^{19,25} 129.5 ¹⁸ @ 754mm 130 to 131.5 ⁷³ @ 751.3mm 126 to 128 ⁷³ @ 739mm	0.7765 0.7601 ⁵¹ @ 40° 0.7755 ⁷³ @ 21° 0.7772 ⁷ @ 20.2° 0.7718 ^{18,52} 0.7756 ⁵¹ 0.7766 ^{19,25} 0.7789 ^{71,73} @ 16.5° 0.7812 ^{19,25} @ 15° 0.7814 ⁷ @ 14.9°	1.4265₈ 1.4256 ⁵² @ 22° 1.4259 ⁷³ @ 21° 1.4263 ⁵² 1.4266 ⁷ 1.4269 ^{19,25,51} 1.4270 ^{71,73} @ 16.5° 1.4289 ⁵² @ 14.7° 1.4329 ⁵² @ 6.8° 1.4353 ⁵² @ 0° 1.4480 ⁵² @ -26.3° 1.42285 ¹⁸ n _{H_a} ²⁰ 1.4245 ⁷ n _{H_a} ^{19,9} 1.43040 ¹⁸ n _{H_β} ²⁰ 1.4319 ⁷ n _{H_β} ^{19,95} 1.43474 ¹⁸ n _{H_γ} ²⁰ 1.42470 ¹⁸ n _{H_δ} ²⁰	$\frac{dD}{dt} = -0.000849/^\circ\text{C.}$ (15° to 40°) $\frac{dn}{dt} = -0.000461/^\circ\text{C.}$ (-30° to +25°)

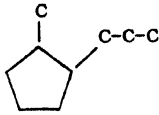
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Isopropylcyclopentane 	-112.7 ⁵²	126.8 ⁵¹ 128 to 129 ¹⁸ @ 754mm 123 to 124 ³⁷ @ 731.6mm	0.7766 0.7593 ⁵¹ @ 40° 0.7717 ¹⁸ 0.7764 ⁵¹ 0.77640 ⁵² 0.7785 ³⁷ @ 18°	1.4264 1.4252 ⁵² @ 22° 1.4261 ⁵¹ 1.4273 ³⁷ @ 18° 1.4284 ⁵³ @ 15° 1.4317 ⁵³ @ 7.7° 1.4468 ⁵³ @ -26.3° 1.42255 ¹⁸ $n_{H_a}^{20}$ 1.43010 ¹⁸ $n_{H_\beta}^{20}$ 1.43454 ¹⁸ $n_{H_\gamma}^{20}$ 1.42470 ¹⁸ $n_{H_e}^{20}$	$\frac{dD}{dt} = -0.00086/^\circ\text{C.}$ (15° to 40°) $\frac{dn}{dt} = -0.00042/^\circ\text{C.}$ (-25° to +25°)
cis-1-Methyl-2-ethyl- cyclopentane 		128.24 to 128.26 ¹⁸ 127.7 to 128 ¹⁸	0.7850 ₁ 0.78508 ¹⁸ 0.7846 ¹⁸ 0.8011 ¹⁸ @ 0°	1.4291 ¹⁸ 1.4269 ¹⁸ $n_{H_a}^{20}$ 1.4344 ¹⁸ $n_{H_\beta}^{20}$ 1.4387 ¹⁸ $n_{H_\gamma}^{20}$	$\frac{dD}{dt} = -0.000802/^\circ\text{C.}$ (0° to 20°)

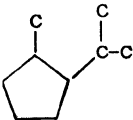
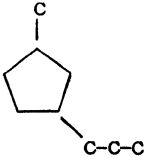
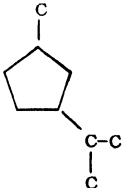
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
trans-1-Methyl-2-ethylcyclopentane 		121.4 to 121.75 ¹³ 121.35 to 121.40 ¹⁶	0.7691 0.7696 ¹³ 0.76912 ¹⁶ 0.7860 ¹³ @ 0°	1.4220 ¹³ 1.4198 ¹³ n _H ²⁰ _a 1.4272 ¹³ n _H ²⁰ _β 1.4314 ¹³ n _H ²⁰ _γ	$\frac{dD}{dt} = -0.000843/^\circ\text{C.}$ (0° to 20°)
1-Methyl-2-ethylcyclopentane 		124 ⁴⁸ 121 ⁴⁹ @ 753mm	0.7728 ⁴⁹	1.42835 ⁴⁹	
d-1-Methyl-3-ethylcyclopentane 		120.5 to 121 ⁶⁶ @ 756mm	0.7669 ⁶⁶ @ 16°	1.4214 ⁶⁶ @ 16°	[α] _D = +4.34° ⁶⁶

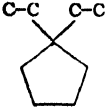
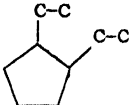
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,1,2-Trimethyl- cyclopentane (Dihydroisolaurelene) <div>  </div>		114 ^{74,75} 114 ⁷⁴ @ 755mm 113 to 113.5 ^{17,41} @ 750mm 113 to 114 ⁴¹ @ 749mm	0.7710₄ 0.7694 ¹⁷ D ₂₅ ²⁵ 0.7727 ¹⁷ D ₂₀ ²⁰ 0.7661 ⁴¹ D ₀ ²⁰ 0.7719 ⁷⁴ @ 19° 0.7728 ^{74,75} @ 18° 0.7686 ⁷⁴ @ 17° 0.7746 ²¹ @ 16.2° 0.77463 ¹⁷ @ 16.2° 0.7762 ^{17,41} D ₁₅ ¹⁵ 0.7706 ⁴¹ D ₁₅ ¹⁵ 0.7800 ¹⁷ D ₁₀ ¹⁰ 0.7847 ¹⁷ @ 4°	1.4199 ⁴¹ 1.4234 ⁷⁴ @ 19° 1.4238 ^{74,75} @ 18° 1.4223 ⁷⁴ @ 17° 1.42244 { ^{17,} ²¹ n _{H_a} ^{16,2} 1.42998 { ^{17,} ²¹ n _{H_β} ^{16,2} 1.43398 { ^{17,} ²¹ n _{H_γ} ^{16,2}	$\frac{dD}{dt} = -0.000869/^\circ\text{C.}$ (0° to 25°)
1,1,3-Trimethyl- cyclopentane <div>  </div>		115 to 116 ⁸¹	0.7703 ⁸¹	1.4223 ⁸¹	

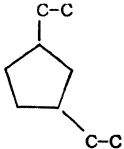
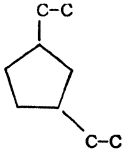
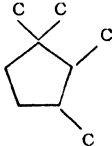
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2,3-Trimethyl- cyclopentane (Dihydrolaurelene) 		114 to 115 ^{74,75} 111.5 to 114 ¹⁷	0.7567 ¹⁷ D ₂₅ ²⁵ 0.7596 ¹⁷ D ₂₀ ²⁰ 0.7588 ^{17,21} @ 19.8° 0.7688 ^{74,75} @ 19° 0.7633 ¹⁷ D ₁₅ ¹⁵ 0.7718 ¹⁷ @ 4°	1.4230 ^{74,75} @ 19° 1.41424 { ^{17,} ²¹ n _{H_a} ^{19,8} 1.42162 { ^{71,} ²¹ n _{H_β} ^{19,8} 1.42591 { ¹⁷ ²¹ n _{H_γ} ^{19,8}	
C₈H₁₆ Butylcyclopentane 	- 108.2 ⁷ - 112.1 59a	154.5 to 156 ⁵⁶ @ 762.7mm 157.2 ^{10,25} 156.8 ^{7,51} 154.5 to 155 ⁵² @ 750mm	0.7843 0.7687 ⁵¹ @ 40° 0.7848 ⁷ @ 20.2° 0.7832 ⁵¹ 0.7847 ^{19,25} 0.7862 ³⁶ @ 16° 0.7886 ^{19,25} @ 15° 0.7887 ⁷ @ 14.95°	1.4315 1.4309 ⁵² @ 21.9° 1.4314 ⁷ @ 20.2° 1.4310 ^{19,25} 1.4315 ⁵² 1.4317 ⁵¹ 1.4336 ³⁶ @ 16° 1.4336 ⁵² @ 14.8° 1.4380 ⁵² @ 6.2° 1.4529 ⁵² @ - 26.6° 1.4292 ⁷ n _{H_a} ^{20,35} 1.4366 ⁷ n _{H_β} ^{20,4}	$\frac{dD}{dt} = -0.000781/^\circ\text{C.}$ (15° to 40°) $\frac{dn}{dt} = -0.000460/^\circ\text{C.}$ (-30° to +25°)

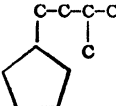
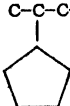
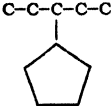
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
2-Cyclopentylbutane 		154.6 ⁵¹ 152.5 to 153.5 ^{36,37} @ 763.7mm 151 to 152 ⁵² @ 741mm 152 to 154 ⁵³ @ 725mm	0.7944₆ 0.7787 ⁵¹ @ 40° 0.79407 ⁵² 0.7941 ⁵¹ 0.7971 ^{36,37} @ 18° 0.810 ⁵³ @ 0°	1.4362 1.4356 ⁵² @ 21.3° 1.4361 ⁵¹ 1.4370 ^{36,37} @ 18° 1.4386 ⁵² @ 14.7° 1.4415 ⁵² @ 7.8° 1.4554 ⁵² @ -26.3°	$\frac{dD}{dt} = -0.000790/^\circ\text{C.}$ (0° to 40°) $\frac{dn}{dt} = -0.00042/^\circ\text{C.}$ (-25° to 25°)
2-Methyl-1-Cyclopentylpropane 		148 to 149 ¹⁸ @ 756mm	0.7795 ¹⁸	1.42738 ¹⁸ $n_{H_a}^{20}$ 1.43516 ¹⁸ $n_{H_\beta}^{20}$ 1.43980 ¹⁸ $n_{H_\gamma}^{20}$ 1.42950 ¹⁸ $n_{H_e}^{20}$	
2-Methyl-2-cyclopentylpropane (<i>tert</i> -Butylcyclopentane) 	-96 ⁵¹	145.2 ⁵¹	0.7753 ⁵¹ @ 40° 0.7911 ⁵¹	1.4342 ⁵¹ 1.4341 ⁵¹ 1.4320 ⁵¹ $n_{H_a}^{20}$ 1.4396 ⁵¹ $n_{H_\beta}^{20}$	$\frac{dD}{dt} = -0.00079/^\circ\text{C.}$ (20° to 40°)

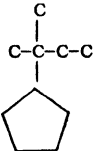
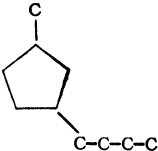
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
cis-1-Methyl-2-propyl- cyclopentane 	-104.9 ¹⁵	152.58 ^{15,16}	0.79212 ¹⁵ ₁₆ 0.80783 ¹⁵ @ 0°	1.43432 ¹⁵ 1.43211 ¹⁵ n _{H_a} ²⁰ 1.43962 ¹⁵ n _{H_β} ²⁰ 1.44395 ¹⁵ n _{H_γ} ²⁰ 1.43858 ¹⁵ n _{H_δ} ²⁰ 1.43171 ¹⁵ n _{H_ε} ²⁰ 1.43442 ¹⁵ n _{H_ζ} ²⁰	$\frac{dD}{dt} = -0.000786/^\circ\text{C.}$ (0° to 20°)
trans-1-Methyl-2- propylcyclopentane		146.37 ¹⁶ 146.37 to 146.38 ¹⁵	0.7774 ₃ 0.7774 ¹⁶ 0.77743 ¹⁵ 0.79328 ¹⁵ @ 0°	1.42740 ¹⁵ 1.42526 ¹⁵ n _{H_a} ²⁰ 1.43279 ¹⁵ n _{H_β} ²⁰ 1.43705 ¹⁵ n _{H_γ} ²⁰ 1.43173 ¹⁵ n _{H_δ} ²⁰ 1.42496 ¹⁵ n _{H_ε} ²⁰ 1.42750 ¹⁵ n _{H_ζ} ²⁰	$\frac{dD}{dt} = -0.000793/^\circ\text{C.}$ (0° to 20°)

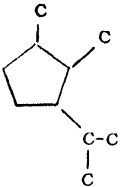
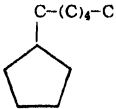
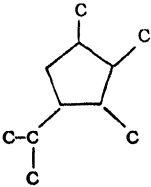
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Methyl-2-isopropyl-cyclopentane 		142.5 ⁴³ @ 759mm	0.7792 ⁴³ D_0^{20} 0.7833 ⁴³ D_0^{15}	1.4279 ⁴³	
1-Methyl-3-propyl-cyclopentane 		146 to 148 ⁷⁰ @ 742mm			
1-Methyl-3-isopropyl-cyclopentane 		140 to 142.5 ³⁰ @ 764.8mm 142 to 144 ⁶² 133 to 134 ³⁰ 132 to 134 ³⁰ 142.5 ⁴³ @ 759mm 141.5 to 142 ²² @ 758mm	0.7730 ⁶² @ 22° 0.7792 ⁴³ 0.773 ³⁰ @ 19° 0.7750 ³⁸ @ 18.5° 0.7799 ²² @ 15.2°	1.4236 ⁶² @ 22° 1.4279 ⁴³ 1.4250 ³⁰ @ 19° 1.4257 ³⁸ @ 18.5° 1.42744 ²² $n_{H_a}^{15.2}$ 1.43505 ²² $n_{H_\beta}^{15.2}$ 1.43947 ²² $n_{H_\gamma}^{15.2}$	

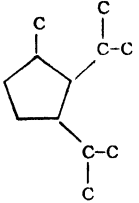
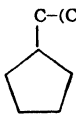
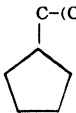
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,1-Diethylcyclopentane 		150.5 ⁴² @ 757mm.	0.8028 ⁴² D ₄ ²⁰	1.4388 ⁴²	
cis-1,2-Diethylcyclopentane 	-118.7 ¹⁴	153.55 to 153.58 ¹⁴ 153.58 ¹⁸	0.79599 ^{14, 18} 0.81165 ¹⁴ @ 0°	1.43552 ¹⁴ 1.43562 ¹⁴ 1.43332 ¹⁴ n _{H_a} ²⁰ 1.43343 ¹⁴ n _{H_a} ²⁰ 1.44090 ¹⁴ n _{H_β} ²⁰ 1.44100 ¹⁴ n _{H_β} ²⁰ 1.44528 ¹⁴ n _{H_γ} ²⁰ 1.44538 ¹⁴ n _{H_γ} ²⁰	$\frac{dD}{dt} = -0.000783/^\circ\text{C.}$ (0° to 20°)
trans-1,2-Diethylcyclopentane	-95.6 ¹⁴	147.53 ¹⁸ 147.53 to 147.55 ¹⁴	0.78316 ¹⁸ 0.78318 ¹⁴ 0.79858 ¹⁴ @ 0°	1.42950 ¹⁴ 1.42738 ¹⁴ n _{H_a} ²⁰ 1.43487 ¹⁴ n _{H_β} ²⁰ 1.43920 ¹⁴ n _{H_γ} ²⁰	$\frac{dD}{dt} = -0.000771/^\circ\text{C.}$ (0° to 20°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,2-Diethylcyclopentane 		151 to 152 ⁴² @ 755mm	0.7952 ⁴² D_0^{20}	1.4353 ⁴²	
1,3-Diethylcyclopentane 		148 to 149 ⁴⁵ @ 767mm	0.7851 ⁴⁵ D_0^{20}	1.4298 ⁴⁵	
1,1,2,3-Tetramethylcyclopentane 			0.7820 ¹¹ @ 14.1°	1.42781 ¹¹ $n_{H_a}^{14.1}$ 1.43541 ¹¹ $n_{H_\beta}^{14.1}$ 1.43986 ¹¹ $n_{H_\gamma}^{14.1}$	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Methyl-1-cyclopentylbutane 		171 to 172 ³⁶ 168 to 170 ³²	0.7837 ³² @ 25° 0.7868 ³⁶ @ 20.5°	1.4321 ³² @ 25° 1.4340 ³⁶ @ 20.5°	
2-Cyclopentylpentane 		177.5 ⁵²	0.7955 ⁵² @ 40° 0.8099 ⁵²	1.4438 ⁵²	$\frac{dD}{dt} = -0.00072/^{\circ}\text{C.}$ (20° to 40°)
3-Cyclopentylpentane 		174 to 176 ³⁷	0.8116 ³⁷ @ 19°	1.4443 ³⁷ @ 19°	


Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-2-cyclopentylbutane 		173.9 ⁵¹	0.7923 ⁵¹ @ 40° 0.8071 ⁵¹	1.441, ⁵¹ 1.4412 ⁵² @ 21.3° 1.4457 ⁵¹ 1.4439 ⁵² @ 14.6° 1.4470 ⁵² @ 7.7° 1.4619 ⁵² @ -26.6° 1.4433 ⁵¹ n _{H_a} ²⁰ 1.4511 ⁵¹ n _{H_β} ²⁰	$\frac{dD}{dt} = -0.00074/^\circ\text{C.}$ (20° to 40°) $\frac{dn}{dt} = -0.00043/^\circ\text{C.}$ (-25° to +20°)
1-Methyl-3-butylcyclopentane 		170.2 ⁸ @ 750.7mm	0.7840 ⁸ @ 15°	1.4321 ⁸ @ 15° 1.4298 ⁸ n _{H_a} ¹⁵ 1.4418 ⁸ n _{H_γ} ¹⁵	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2-Dimethyl-3-isopropylcyclopentane 		148 to 149 ²⁷ 146 to 148 ³⁰ 161.4 to 161.9 ⁵³ @ 758mm 159 to 160.5 ³⁵ @ 757.6mm 159 to 161 ³⁵ @ 757mm 49.5 to 49.8 ⁵³ @ 14.5mm	0.7877 ³⁵ @ 21° 0.7883 ³⁵ @ 21° 0.786 ³⁰ @ 16° 0.793 ²⁷ @ 15° 0.7929 ⁵³ @ 15°	1.4319 ³⁵ @ 21° 1.4328 ³⁵ @ 21° 1.4344 ⁵³ @ 16.5° 1.4337 ³⁰ @ 16° 1.4364 ²⁷ @ 15°	Kasansky (33) claims that the compound prepared by Godchot and Taboury (29) [which is the same compound as that of Godchot (28)] is not 1,2-dimethyl-3-isopropylcyclopentane.
C₁₁H₂₂ Hexylcyclopentane 		204 to 206 ⁷⁶ @ 748mm	0.7903 ⁷⁶	1.4370 ⁷⁶	
1,2,3-Trimethyl-4-isopropylcyclopentane 		157 to 158 ²⁷	0.7833 ²⁷ @ 13°	1.4326 ²⁷ @ 13°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Methyl-2,3-diisopropylcyclopentane 		150 to 152 ³⁰	0.781 ³⁰ @ 17°	1.4318 ³⁰ @ 17°	
$C_{13}H_{26}$ Octylcyclopentane 		133 to 134 ⁷⁶ @ 26mm	0.8156 ⁷⁶ @ 18°	1.4483 ⁷⁶ @ 18°	
$C_{17}H_{34}$ Dodecylcyclopentane 		175 ¹ @ 15mm	0.8280 ¹ @ 18°	1.45737 ¹	

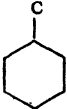
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Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclohexane 		80.7,	0.7781,	1.4264,	$\frac{dT}{dp} = 0.0002548 \frac{T^2}{p}$ degrees/(40mm to 760mm)
	4.5 ^{30a}	81.06 ²⁰	0.72056 ¹⁵⁵	1.4235 ⁹⁰	$\frac{dT}{dp} = 0.0420$ degrees /mm at boiling point ($p = 760$ mm)
	4.7 ¹⁵⁵	@ 764.59mm	@ 80°	@ 25°	Average value of $\frac{dT}{dp}$ between 740 and 760 mm. = 0.0425 degrees /mm.
	5.95 ³⁷	80.2 ¹⁴⁵	0.72215 ⁹⁸	1.42370 ¹⁴⁷	$\frac{dD}{dt} = -0.000972$ (1 - 0.000234 ₄)/°C. (7° to 80°)
	6.10 ¹⁴⁷	@ 763mm	@ 78.05°	@ 25°	$\frac{dn}{dt} = -0.000470$ /°C. (10° to 25°)
	6.2 ⁸⁸	81 to 82.7 ⁸⁹	0.73057 ¹⁵⁵	1.4274 ⁹	Gifford and Lowry ³¹ have determined the index of refraction of cyclohexane at 15° for various wave lengths and have summarized their re- sults in the follow- ing dispersion formula
	6.2 to	81 to 81.5 ¹⁰	@ 70°	@ 25°	
	6.4 ¹⁵¹	81 ^{72,150}	0.73997 ¹⁵⁵	1.4275 ¹³	
	6.25 ¹²	80.93 ⁹	@ 60°	@ 25°	
	6.28 ⁸¹	80.9 ^{24,30a}	0.74060 ¹⁵⁶	1.4242 ¹	
	6.34 ⁸⁵	80.8 to	@ 60°	1.4254 ^{30a}	
		80.9 ^{19,150}	0.74416 ⁹⁸	1.4262 ¹²⁶	
	6.4 ^{22,126,150,150}	80.80 ¹³⁶	@ 50.95°	1.4263 ¹³	
	6.40 ¹³⁶	80.8 ^{12,16,29,126}	0.74957 ¹⁵⁵	1.42636 ⁶⁷	
	6.45 ^{9,13}	80.6 to 80.8 ⁴	@ 50°	1.42648 ⁶⁸	
	6.48 ³³	80.0 to 80.2 ⁵	@ 44.6°	1.4265 ⁹⁹	
	6.5 ^{22,105,112}	80 ¹²³	0.75513 ¹⁰⁵	1.42656 ¹⁴⁵	
	6.55 ⁹⁹	79 to 80 ¹⁰	@ 44.6°	1.4266 ⁹⁰	
	6.7 ⁹⁸	79 ¹³¹	0.7564 ¹⁴⁵	1.42691 ¹⁵¹	
		78.5 to 79.5 ¹²⁷	@ 43.6°	1.427 ³	
		80.8 ¹⁵⁵	0.7570 ¹⁴⁵	1.4275 ¹⁰	
		@ 759.75mm	@ 42.9°	1.4266 ¹⁶⁰	
		80 to 80.5 ³⁸	0.75942 ⁹⁸	@ 19.5°	
		@ 759.5mm	@ 40.21°	1.4269 ¹⁶⁰	
		80.5 ¹⁷³	0.75907 ¹⁵⁵	@ 18°	
		@ 758mm	@ 40°	1.4271 ¹²³	
		80.5 ²³	0.76853 ¹⁵⁵	@ 17.5°	
		@ 756mm	@ 30°	1.42446 ³⁹	
		80.66 ²⁰	0.7692 ¹⁸	@ 17.4°	
		@ 755.69mm	@ 30°	1.42806 ⁴	
		81 ^{106,113}	0.7730 ¹⁴⁵	@ 16.1°	
		@ 755mm	@ 25.6°	1.42886 ¹³⁶	
		80.5 to 80.7 ⁶⁵	0.77384 ⁹⁸	@ 15°	
		@ 755mm	@ 25.08°	1.429001 ³¹	
		80.65 ¹⁵⁵	0.77354 ¹⁴⁷	@ 15°	
		@ 754.7mm	@ 25°	1.4371 ¹²⁷	
		79 to 79.5 ¹	0.7737 ¹³	@ 11°	
		@ 752mm	@ 25°	1.43119 ⁸	
		72 to 73 ⁵⁵	0.7741 ³⁸	@ 10.85°	
		@ 752mm	@ 25°	1.42225 ²⁸	
		80.3 ²²	0.7694 ²⁰	n_D^{25}	
		@ 750mm	D_{25}^{25}		
					$(n_D^{15})^2 = 2.011046$ $+ \frac{0.0102467}{\lambda^2 - 0.013977}$ (3282Å to 7701Å)
					Similarly, Lowry and Allsopp ⁶⁷ have studied the depen- dence of index of re- fraction upon wave length. Their equa- tion is
					$(n_D^{20})^2 = 2.00519$ $+ \frac{0.0098035}{\lambda^2 - 0.011923}$ (2450Å to 6707Å)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclohexane (Continued)		80.0 ¹⁶⁵	0.7758 ¹⁴⁶	1.42437 ¹⁴⁵	
		@ 741.3mm	@ 22.4°	$n_{H_a}^{20}$	
		80.5 to 81 ¹⁷³	0.7772 ¹⁴⁵	1.42476 ²³	
		@ 740mm	@ 20.8°	$n_{H_a}^{20}$	
		80.1 to 80.2 ⁹⁰	0.7763 ¹⁶⁰	1.42211 ²⁹	
		@ 738mm	0.7769 ^{1,173}	$n_{H_a}^{17.4}$	
		79 to 79.5 ¹⁵¹	0.7775 ^{24, 30a, 68}	1.42589 ⁴	
		@ 723mm		$n_{H_a}^{16.1}$	
		75.37 ⁸⁵	0.7780 ¹⁴⁵	1.42698 ²³	
		@ 646.0mm	0.7782 ²³	$n_{H_a}^{15}$	
		70.0 ¹⁵⁵	0.7783 ²³	1.42777 ²⁶	
		@ 540.8mm	0.7784 ^{9 12}	$n_{H_a}^{13.5}$	
		60.0 ¹⁵⁵	0.7786 ⁹⁰	1.42910 ⁵	
		@ 385.0mm	0.7788 ⁸⁹	$n_{H_a}^{10.86}$	
		19.78 ⁹⁸	0.790 ¹¹	1.42971 ²³	
		@ 78.40mm	0.7731 ²⁹	$n_{H_\beta}^{25}$	
		18.44 ²⁰	D_{20}^{20}	1.43184 ¹⁴⁵	
		@ 70.71mm	0.7727 ⁷²	$n_{H_\beta}^{20}$	
		6.90 ⁹⁸	0.7788 ¹⁶⁰	1.43229 ²³	
		@ 40.60mm	@ 19.5°	$n_{H_\beta}^{20}$	
		6.14 ⁹⁸	0.7808 ¹¹²	1.42960 ²⁹	
		@ 38.70mm	@ 18°	$n_{H_\beta}^{17.4}$	
			0.781 ¹⁵¹	1.43345 ⁴	
			@ 18°	$n_{H_\beta}^{16.1}$	
			0.7834 ¹²³	1.43447 ²³	
			@ 17°	$n_{H_\beta}^{15}$	
			0.78221 ⁹⁶	1.43531 ²⁵	
			@ 16.12°	$n_{H_\beta}^{13.5}$	
			0.7808 ⁴	1.43668 ⁵	
			@ 16.1°	$n_{H_\beta}^{10.86}$	
			0.7820 ²⁵	1.43415 ²³	
			@ 15.9°	$n_{H_\gamma}^{25}$	
			0.7824 ²⁸	1.43580 ¹⁴⁵	
			@ 15°	$n_{H_\gamma}^{20}$	
			0.78224 ¹⁵⁴		
			@ 15°		

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclohexane (Continued)			0.7830 ¹⁸ @ 15°	1.43668 ²³ $n_{H\gamma}^{20}$	
			0.78310 ¹³⁶ @ 15°	1.43391 ²⁹ $n_{H\gamma}^{17.4}$	
			0.7771 ²⁹ D_{16}^{18}	1.43773 ⁴ $n_{H\gamma}^{16.1}$	
			0.774 ⁷² D_{16}^{18}	1.43892 ²³ $n_{H\gamma}^{15}$	
			0.78280 ¹⁶⁵ @ 14.5°	1.43972 ²⁵ $n_{H\gamma}^{13.5}$	
			0.78435 ¹⁰⁶ @ 13.5°	1.44116 ⁵ $n_{H\gamma}^{10.86}$	
			0.7844 ²⁵ @ 13.5°	1.5232 ¹⁴² $n_{2180}^{15.3}$	
			0.7869 ⁵ @ 11.2°	1.4388 ¹⁴² $n_{4200}^{15.3}$	
			0.7875 ¹²⁷ @ 11°		
			0.7872 ⁵ @ 10.85°		
			0.78715 ¹⁵⁵ @ 10.7°		
			0.7812 ²⁹ D_{10}^{10}		
			0.79063 ⁹⁸ @ 7.00°		
			0.7865 ²⁹ @ 4°		
			0.7903 ²⁹ @ 0°		
			0.7967 ¹⁶ @ 0°		
			0.8352 ⁹⁹ @ 0°		
			0.7902 ⁷² D_0^0		

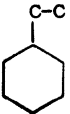
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Methylcyclohexane		100.3	0.7692₇	1.4230₉	$\frac{dD}{dt} = -0.000857/^{\circ}\text{C.}$ (0° to 80°)
	-126.3 119, 126, 132	100.0 ²³ @ 780mm	0.7174 ²⁵ @ 78.8°	1.4198 ¹	$\frac{dn}{dt} = -0.000481/^{\circ}\text{C.}$ (10° to 20°)
	-126.4 126, 135, 136, 148	100.4 to 145 100.7 @ 773mm	0.7344 ¹⁴⁵ @ 62.1°	1.4227 ¹⁰ 1.423 ³	
	-126.7 137	100.0 ²³ @ 770mm	0.7512 ¹⁴⁵ @ 42.1°	1.4230 ^{43, 89, 116}	*The density and refractive index values of Eisenlohr and Gorr (ref. 23) are each the mean of five separate determinations reported in the paper.
	-126.85 134	100 ¹⁴⁵ @ 770mm	0.76030 ¹³⁶ @ 30°	1.42306 ⁶⁸ 1.4231 ¹²⁶	
	-126.9 ⁶⁸	103 ⁵¹ 102 ⁶³ 101.20 ¹³⁶ 101.1 ¹¹⁹ 101 to 49, 122, 158 102 101 ^{2, 133, 134} 101.0 ^{24, 30a} 100.8 to 127 100.9 100.8 ¹²⁶ 100.80 ¹⁴⁸ 100.4 ¹⁰ 100.30 ¹³⁵ 100 to 101 ¹¹¹ 100 ^{30a} 99.8 to 100.8 ¹¹⁸ 99.4 to 102 ⁸⁹ 99 to 101 ¹⁰ 98 to 100 ¹²⁷ 99.5 to 100 ^{23, 145} @ 759mm 100 ²³ @ 758mm 100.5 ⁴ @ 754mm 100.2 ⁷³ @ 751mm	0.7679 ^{**} 143, 145 0.7687 ^{1, 69, 89} 0.7688 ¹³⁷ 0.7689 ¹⁰ 0.7693 ¹⁵⁹ 0.7694 ^{**} 144, 145, 159 0.76944 ¹⁴⁸ 0.7696 ^{24, 30a} 0.7697 ⁷³ 0.7704 ^{**} 143, 145 0.77304 ^{* 23} 0.769 ¹¹⁸ D ₂₀ ²⁰ 0.7641 ⁵³ D ₀ ²⁰ 0.7695 ⁴³ D ₀ ²⁰ 0.7622 ⁵¹ @ 18.5° 0.7647 ¹⁵⁸ @ 18° 0.7662 ⁵¹ @ 18° 0.7718 ²⁵ @ 16.9° 0.7725 ²⁵ @ 16.3°	1.4239 ^{24, 30a} 1.42410 ^{**} 143, 145 1.4243 ¹⁵⁹ @ 19° 1.41705 ⁵¹ @ 18.5° 1.4243 ¹⁵⁹ @ 18° 1.4242 ¹²⁸ @ 17.6° 1.4235 ¹²³ @ 17.5° 1.42531 ⁴ @ 15.5° 1.42535 ¹³³ @ 15° ¹³⁶ 1.4291 ¹²⁷ @ 11° 1.39116 ²⁵ n _H ^{78, 8} 1.42081 ^{**} 143, 145 n _H ^{20, 0} 1.42085 ¹⁴⁸ n _H ^{20, 00} 1.42093 ¹⁴⁴ n _H ^{20, 0} ¹⁴⁵	


*The density and refractive index values of Eisenlohr and Gorr (ref. 23) are each the mean of five separate determinations reported in the paper.

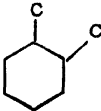
**Vogel (ref. 143, 144, 145) reports the existence of three isomeric liquid forms of cyclohexane, the individual constants of which are given in the tables.

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Methylcyclohexane (Continued)		100.3 to 100.9 ⁶⁸ @ 745mm	0.7773 ⁴ @ 15.5°	1.42167 ^{143, 145}	
		100 to 100.2 ¹ @ 742mm	0.77340 ¹³⁶ @ 15°	$n_{H_a}^{20.00**}$ 1.42311 ²³	
			0.7736 ^{24, 30a} @ 15°	$n_{H_a}^{20}$ 1.42296 ²⁵	
			0.7737 ¹⁸ @ 15°	$n_{H_a}^{16.9}$ 1.42330 ²⁵	
			0.774 ⁷³ D_{16}^{15}	$n_{H_a}^{16.3}$ 1.42308 ⁴	
			0.7693 ¹⁵⁹ @ 14°	$n_{H_a}^{15.5}$ 1.39816 ²⁵	
			0.7738 ³² $D_{13.5}^{13.5}$	$n_{H_\beta}^{78.8}$ 1.42838 ¹⁴⁸	
			0.7791 ¹²⁷ @ 11°	$n_{H_\beta}^{20.00}$ 1.42839 ^{**}	
			0.780 ¹⁶ @ 0°	$n_{H_\beta}^{20.0}$ 1.42846 ^{**}	
			0.7859 ¹¹² @ 0°	$n_{H_\beta}^{20.0}$ 1.42915 ^{143, 145}	
			0.78640 ¹³⁵ @ 0°	$n_{H_\beta}^{20.0}$ 1.43082 ²³	
			0.78650 ¹³⁶ @ 0°	$n_{H_\beta}^{20}$ 1.43053 ²⁵	
			0.7868 ¹⁸ @ 0°	$n_{H_\beta}^{16.9}$ 1.43088 ²⁵	
			0.7804 ⁵³ D_6^0	$n_{H_\beta}^{16.3}$ 1.43058 ⁴	
			0.7859 ⁷³ D_6^0	$n_{H_\beta}^{15.5}$ 1.40230 ²⁵	
			0.7887 ⁴² D_6^0	$n_{H_\gamma}^{78.8}$ 1.43230 ^{143, 145}	
				$n_{H_\gamma}^{20.0}$	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Methylcyclohexane (Continued)				1.43250 $\left\{ \begin{smallmatrix} 144. \\ 145 \end{smallmatrix} \right.$ $n_{H\gamma}^{20.0 \text{ } \infty}$ 1.43285 ¹⁴⁸ $n_{H\gamma}^{20.00}$ 1.43301 $\left\{ \begin{smallmatrix} 143. \\ 145 \end{smallmatrix} \right.$ $n_{H\gamma}^{20.0}$ 1.43524 ²³ $n_{H\gamma}^{20 \text{ } \infty}$ 1.43498 ²⁵ $n_{H\gamma}^{16.0}$ 1.43533 ²⁵ $n_{H\gamma}^{16.3}$ 1.43502 ⁴ $n_{H\gamma}^{15.5}$ 1.42540 ²³ $n_{H\delta}^{20 \text{ } \infty}$	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Ethylcyclohexane		131.8	0.7878,	1.4329,	$\frac{dD}{dt} = -0.000770/^{\circ}\text{C.}$ (0° to 20°)
	-111.40 ⁹⁷	132 to 134 ¹⁴⁰	0.7899 ¹	1.4278 ¹	$\frac{dn}{dt} = -0.000436/^{\circ}\text{C.}$ (10° to 25°)
	-128.9 ¹³²	131.89 ⁹⁷	@ 25°	@ 25°	
		131.8 ¹³²	0.7771 ⁵⁸	1.43079 ⁹⁷	
		131.6 ^{24,30a}	0.7840 ^{22,57}	@ 25°	
		131 to 132 ¹⁰	0.7854 ⁶⁶	1.4320 ^{24,30a}	
		130.1 to	0.7872 ⁶⁸	1.4324 ⁵⁷	
		130.7 ¹¹⁸	0.7875 ^{24,30a}	1.43283 ⁶⁸	
		130 ¹¹²	0.78804 ⁹⁷	1.4329 ¹⁰	
		128.5 to	0.787 ¹¹⁸	1.4332 ¹¹⁸	
		130 ¹²⁷	D ₂₀ ²⁰	1.4343 ⁶⁶	
		128 to 129 ¹¹¹	0.793 ¹⁴⁰	1.436 ¹⁴⁰	
		129.5 ²³	@ 17°	@ 17°	
		@ 756mm	0.7914 ^{24,30a}	1.4373 ¹²⁷	
		132 to 133 ⁵³	@ 15°	@ 11°	
		@ 755mm	0.7972 ¹²⁷	1.43041 ²³	
		130 to 131 ⁶⁶	@ 11°	n _{H_a} ²⁰	
		@ 751mm	0.7997 ⁵⁷	1.43803 ²³	
		130 to 132 ⁶⁸	@ 0°	n _{H_β} ²⁰	
		@ 745mm	0.8025 ¹¹²	1.44272 ²³	
		129.8 to 130 ¹	@ 0°	n _{H_γ} ²⁰	
		@ 743mm	0.8026 ¹¹¹	1.43251 ²³	
		128 ¹⁵²	@ 0°	n _{H_δ} ²⁰	
		@ 724mm	0.7913 ⁵³		
			D ₀ ⁰		

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,1-Dimethyl- cyclohexane		119.,	0.7810	1.4293	$\frac{dD}{dt} = -0.000804/^\circ\text{C.}$ (0° to 25°)
	-34.1 ⁸⁰ -35.1 ¹⁸	120 ¹⁹ @ 766mm 118 to 118.5 ³⁰ @ 764mm 121.2 to 121.8 ¹⁸ 120 ^{38,63} 119.7 to 119.9 ⁸⁰ 119.2 to 119.7 ¹⁶⁶ 118.5 to 120 ¹⁶³ 119.2 to 119.7 ⁷⁰ @ 752.8mm 119.5 to 120 ¹⁵ @ 751mm	0.7798 ¹⁹ D_{25}^{25} 0.7786 ¹⁷⁰ @ 21° 0.78073 ⁸⁰ 0.7820 ¹⁶³ 0.7825 ³⁸ 0.7832 ¹⁹ D_{20}^{20} 0.7890 ³⁸ @ 17.6° 0.7843 ¹⁶⁶ @ 16° 0.775 ¹⁶ @ 15° 0.7840 ¹⁵ @ 15° 0.7864 ¹⁹ D_{15}^{15} 0.7947 ¹⁹ @ 4° 0.79709 ⁸⁰ @ 0°	1.4285 ¹⁷⁰ @ 21° 1.4289 ³⁰ 1.4342 ¹⁶³ @ 18° 1.4351 ³⁸ @ 17.6° 1.4314 ¹⁵ @ 15° 1.4320 ¹⁶⁶ @ 11° 1.42958 ¹⁹ $n_{H_a}^{15,5}$ 1.4290 ¹⁵ $n_{H_a}^{15}$ 1.43728 ¹⁹ $n_{H_\beta}^{15,5}$ 1.44203 ¹⁹ $n_{H_\gamma}^{15,5}$ 1.4413 ¹⁵ $n_{H_\gamma}^{15}$ 1.42359 ⁸⁰ $n_{H_e}^{20,4}$ 1.42680 ⁸⁰ $n_{H_e}^{19,3}$ 1.42635 ⁸⁰ $n_{H_e}^{26,4}$ 1.42959 ⁸⁰ $n_{H_e}^{18,8}$ 1.43489 ⁸⁰ $n_{H_e}^{26,4}$ 1.43822 ⁸⁰ $n_{H_e}^{19,3}$	$\frac{dn}{dt} = -0.000355/^\circ\text{C.}$ (10° to 25°)

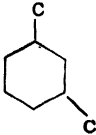
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
cis-1,2-Dimethyl- cyclohexane 	- 50.1 ⁷⁸ ₇₉ - 57.5 ¹⁴	130.26 ⁷⁸ 130.04 ⁷⁹ 128.4 to 129.5 ¹⁴ 128.3 to 128.7 ¹⁶⁷ 126.5 ¹²⁴ 126.5 ²³ @ 750mm	0.7965 0.7891 ¹⁸ @ 30° 0.7822 ²³ 0.786 ¹²⁴ 0.7868 ²³ 0.7905 ¹⁶⁷ 0.79620 ⁷⁸ 0.79625 ⁷⁹ 0.8015 ¹⁴ @ 15° 0.8016 ¹⁸ @ 15° 0.81125 ⁷⁸ @ 0° 0.81311 ⁸⁰ @ 0°	1.43114 ¹²⁴ 1.4333 ¹⁶⁷ 1.43369 ⁷⁹ n _{H_a} ^{20,30} 1.43373 ⁷⁹ n _{H_a} ^{20,30} 1.42859 ²³ n _{H_a} ²⁰ 1.43050 ²³ n _{H_a} ²⁰ 1.43669 ⁷⁹ n _{H_a} ^{13,78} 1.44133 ⁷⁹ n _{H_β} ^{20,30} 1.44138 ⁷⁹ n _{H_β} ^{20,30} 1.43635 ²³ n _{H_β} ²⁰ 1.43823 ²³ n _{H_β} ²⁰ 1.44439 ⁷⁹ n _{H_β} ^{13,78} 1.44585 ⁷⁹ n _{H_γ} ^{20,30} 1.44088 ²³ n _{H_γ} ²⁰ 1.44271 ²³ n _{H_γ} ²⁰ 1.44897 ⁷⁹ n _{H_γ} ^{13,78} 1.43060 ²³ n _{H_ε} ²⁰ 1.43241 ²³ n _{H_ε} ²⁰	$\frac{dD}{dt} = -0.000784/^\circ\text{C.}$ (0° to 30°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
cis-1,2-Dimethyl- cyclohexane (Continued)				1.43061 ⁸⁰ n _{H_er} ^{20.4}	
				1.43387 ⁸⁰ n _{H_er} ^{18.8}	
				1.43343 ⁸⁰ n _{H_ey} ^{20.4}	
				1.43598 ⁷⁹ n _{H_ey} ^{20.30}	
				1.43599 ⁷⁹ n _{H_ey} ^{20.30}	
				1.43663 ⁸⁰ n _{H_ey} ^{18.8}	
				1.43901 ⁷⁹ n _{H_ey} ^{13.78}	
				1.44211 ⁸⁰ n _{H_eo} ^{20.}	
				1.44548 ⁸⁰ n _{H_eo} ^{18.8}	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
trans-1,2-Dimethyl- cyclohexane			0.776	1.4303	$\frac{dD}{dt} = -0.000794/^{\circ}\text{C.}$ (0° to 20°)
	- 89.4 ⁷⁹	125 ¹¹¹	0.7760 ⁷⁸	1.42930 ⁶⁸	
	- 89.6 ⁷⁸	124.5 ¹⁶²	0.77601 ⁷⁹	1.43020 ¹²¹	
		124 ¹²⁴	0.779 ¹²¹	1.43037 ¹²⁴	
		123.9 ⁶⁸	0.7798 ²³	1.4305 ⁷¹	
		123.85 ⁷⁸	0.780 ¹²⁴	1.4326 ¹⁶⁷	
		123.70 ⁷⁹	0.7811 ⁷¹	1.42466 ⁷⁹	
		123.42 to	0.7814 ⁶⁸	n _{H_a} ^{20,35}	
		124.17 ⁷¹	0.7822 ¹²⁷	1.42470 ⁷⁸	
		122.5 to	0.7823 ¹⁶⁷	n _{H_a} ^{20,35}	
		123.5 ¹²¹	0.7920 ³²	1.42778 ²³	
		121.3 to	D _{13.4} ^{13,4}	n _{H_a} ²⁰	
		121.5 ³²	0.79188 ⁸⁰	1.42768 ⁷⁸	
		126 to	@ 0°	n _{H_a} ^{13,35}	
		126.5 ¹⁶⁷	0.8008 ¹¹¹	1.43224 ⁷⁹	
		@ 758mm	@ 0°	n _{H_β} ^{20,35}	
		124.5 ²⁸		1.43230 ⁷⁸	
		@ 755mm		n _{H_β} ^{20,35}	
		122.5 to 124 ⁶⁸		1.43546 ²³	
		@ 748mm		n _{H_β} ²⁰	
				1.43533 ⁷⁸	
				n _{H_β} ^{13,35}	
				1.4365 ⁷⁹	
				n _{H_γ} ^{20,35}	
				1.43673 ⁷⁸	
				n _{H_γ} ^{20,35}	
				1.44008 ²³	
				n _{H_γ} ²⁰	
				1.43979 ⁷⁸	
				n _{H_γ} ^{13,35}	
				1.42990 ²³	
				n _{H_e} ²⁰	
				1.42171 ⁸⁰	
				n _{H_{e,r}} ^{20,4}	
				1.42493 ⁸⁰	
				n _{H_{e,r}} ^{18,8}	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
trans-1,2-Dimethyl- cyclohexane (Continued)				1.42443 ⁸⁰ n _{H₂O} ^{26.4} _v 1.42695 ⁷⁹ n _{H₂O} ^{20.35} _v 1.42701 ⁷⁸ n _{H₂O} ^{20.35} _v 1.42768 ⁸⁰ n _{H₂O} ^{18.8} _v 1.42999 ⁷⁸ n _{H₂O} ^{15.88} _v 1.43331 ⁸⁰ n _{H₂O} ^{26.4} _o 1.43641 ⁸⁰ n _{H₂O} ^{18.8} _o	


Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,2-Dimethyl- cyclohexane		128.6 to 129 ¹⁷	0.780 ¹²⁴	1.4266 ¹⁸²	
		127.9 ^{24,30a}	0.7874 ^{24,30a}	1.4292 ³	
		126.5 ¹²⁴	0.792 ¹¹⁸	1.4314 ^{24,30a}	
		126.4 to 128.9 ¹¹⁸	D_{20}^{20}	1.4332 ¹¹⁸	
			0.7809 ³	1.43020 ³	
		126 ¹¹²	@ 17.85°	@ 17.85°	
		125 ¹¹¹	0.7912 ^{24,30a}	1.4347 ¹²⁷	
		124.5 ¹⁶²	@ 15°	@ 11°	
		124 ¹⁰⁶	0.798 ¹⁷	1.42820 ³	
			@ 15°	$n_{H_a}^{17,8b}$	
		123 to 125 ¹²⁷	0.7880 ²⁷	1.43134 ²⁷	
		122.5 to 123.5 ³	@ 14.25°	$n_{H_a}^{14,2b}$	
			0.7929 ¹²⁷	1.43592 ³	
		124.5 ²⁷	@ 11°	$n_{H_\beta}^{17,8b}$	
		@ 731mm	0.8008 ¹¹²	1.43901 ²⁷	
			@ 0°	$n_{H_\beta}^{14,2b}$	
			0.8002 ¹⁰⁶	1.44056 ³	
			D_0^0	$n_{H_\gamma}^{17,8b}$	
				1.44342 ²⁷	
				$n_{H_a}^{14,2b}$	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
cis-1,3-Dimethyl- cyclohexane 	- 86 to - 90 ¹⁴ - 100 ⁸⁰	124.9 ⁸⁰ 123.5 ⁹⁹ 121.5 ¹²⁴ 121 to 122 ¹⁷ 121.0 ²³ 121 ¹²¹ 119.5 to 122.3 ¹⁴	0.783 ₅ 0.7613 ¹⁸ @ 30° 0.7735 ²³ 0.774 ¹²¹ 0.775 ¹²⁴ 0.777 ⁸³ 0.78348 ⁸⁰ 0.7728 ¹⁴ @ 15° 0.7759 ¹⁴ @ 15° 0.7852 ¹⁸ @ 0° 0.80022 ⁸⁰ @ 0°	1.42609 ¹²⁴ 1.4265 ⁸³ 1.4269 ¹²¹ 1.42385 ²³ n _H ²⁰ _a 1.43170 ²³ n _H ²⁰ _β 1.43628 ²³ n _H ²⁰ _γ 1.42600 ²³ n _H ²⁰ _δ 1.42495 ⁸⁰ n _H ^{20.4} _r 1.42835 ⁸⁰ n _H ^{18.8} _r 1.42765 ⁸⁰ n _H ^{20.4} _v 1.43099 ⁸⁰ n _H ^{18.8} _v 1.43645 ⁸⁰ n _H ^{20.4} _g 1.43972 ⁸⁰ n _H ^{18.8} _g	$\frac{dD}{dt} = -0.0008_4/^{\circ}\text{C.}$ (0° to 20°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
trans-1,3-Dimethyl- cyclohexane	-79.4 ⁸⁰	120.59 to 121.59 ⁷¹ 120.40 ⁸⁰ 119.5 ⁸³ 119 ¹²¹ 119 ²³ @ 756mm	0.762 ⁸³ 0.76628 ⁸⁰ 0.7706 ⁷¹ 0.772 ^{121,124} 0.78251 ⁸⁰ @ 0°	1.4176 ⁸³ 1.4254 ¹²¹ 1.4262 ⁷¹ 1.42470 ¹²⁴ 1.42265 ²³ n _{H_a} ²⁰ 1.43030 ²³ n _{H_β} ²⁰ 1.43493 ²³ n _{H_γ} ²⁰ 1.42480 ²³ n _{H_δ} ²⁰ 1.41772 ⁸⁰ n _{H_{e,r}} ^{26.4} 1.42099 ⁸⁰ n _{H_{e,r}} ^{18.8} 1.42047 ⁸⁰ n _{H_{e,v}} ^{26.4} 1.42376 ⁸⁰ n _{H_{e,v}} ^{18.8} 1.42919 ⁸⁰ n _{H_g} ^{26.4} 1.43254 ⁸⁰ n _{H_g} ^{18.8}	

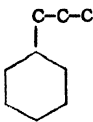
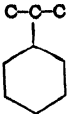
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,3-Dimethyl- cyclohexane		121.6 ^{24,30a}	0.7208 ²⁵	1.4218 ¹⁶¹	
		121.3 to	@ 81°	@ 26°	
		121.5 ³²	0.7661 ¹⁶¹	1.4230 ¹	
		121.2 to	@ 26°	@ 25°	
		121.8 ¹⁷	0.7661 ²⁵	1.4288 ⁴⁸	
		121 to 123 ¹¹¹	@ 25.4°	@ 22.5°	
		121 to	0.7672 ²⁵	1.4239 ¹⁶²	
		121.5 ¹⁶²	@ 25.4°	@ 22°	
		121 ¹¹²	0.773 ¹	1.42398 ⁵	
		120.9 to	@ 25°	@ 22°	
		122.5 ¹¹⁸	0.7671 ⁴⁸	1.42499 ⁵	
		120.8 ¹⁶⁵	@ 24°	@ 20.75°	
		120 to 121 ¹⁶⁷	0.7701 ⁵	1.4234 ¹⁵⁹	
		120 ^{50,111,150}	@ 21.8°	1.42407 ^{22,68}	
		119 to 123 ¹¹⁸	0.7707 ⁵	1.4246 ¹⁶⁵	
		119 to	@ 20.75°	1.42470 ¹²⁴	
		120 ^{122,127}	0.7677 ^{22,68}	1.425 ³	
		119 ^{3,124}	0.7687 ¹⁰⁹	1.4253 ¹¹⁸	
		118 to 120 ⁵	0.7697 ¹⁶⁷	$\left\{ \begin{array}{l} 24, \\ 30a, \\ 167 \end{array} \right.$	
		118 ¹⁰⁶	0.771 ³		
		117 to 120 ¹⁶⁴	0.7712 ¹⁶⁵		
		119.5 ¹⁵⁷	0.772 ¹²⁴	1.4270 ⁵⁰	
		@ 751mm	0.7723 ^{24,30a}	@ 18°	
		118.5 to 119 ¹	0.7822 ¹²²	1.4278 ³²	
		@ 747mm	0.766 ¹⁶⁴	@ 13.5°	
		119.5 to	D ₂₀ ²⁰	1.4298 ¹²⁷	
		120.5 ^{22,68}	0.774 ¹¹⁸	@ 11°	
		@ 740mm	D ₂₀ ²⁰	1.39405 ²⁵	
		119.5 to	0.7688 ¹⁵⁷	n _H ⁵¹ _a	
		120 ¹⁶¹	D ₀ ¹⁹	1.42060 ²⁵	
		@ 739mm	0.7736 ⁵⁰	n _H ^{25.4} _a	
			@ 18°	1.42127 ³⁵	
			0.775 ¹⁷	n _H ^{25.4} _a	
			@ 15°	1.42157 ⁵	
			0.7761 ^{24,30a}	n _H ^{22.0} _a	
			@ 15°	1.42276 ⁵	
			0.7772 ⁴⁸	n _H ^{20.75} _a	
			D _{13.8} ¹⁸	1.40113 ²⁵	
				n _H ⁵¹ _β	

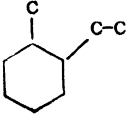
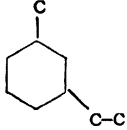
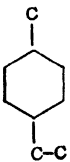
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,3-Dimethyl- cyclohexane (Continued)			0.7812 ¹²⁷	1.42817 ²⁵	
			@ 11°	$n_{H\beta}^{25.4}$	
			0.784 ¹⁸⁴	1.42887 ²⁵	
			@ 0°	$n_{H\beta}^{25.4}$	
			0.7874 ¹¹²	1.42940 ⁵	
			@ 0°	$n_{H\beta}^{22.0}$	
			0.7869 ¹⁰⁶	1.43047 ⁵	
			D_0^0	$n_{H\beta}^{20.76}$	
				1.40528 ²⁵	
				$n_{H\gamma}^{81}$	
				1.43259 ²⁵	
				$n_{H\gamma}^{25.4}$	
				1.43338 ²⁵	
				$n_{H\gamma}^{25.4}$	
				1.43394 ⁵	
				$n_{H\gamma}^{22.0}$	
				1.43500 ⁵	
				$n_{H\gamma}^{20.76}$	

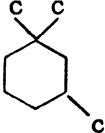
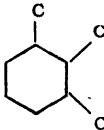
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
cis-1,4-Dimethyl- cyclohexane 	- 84 to - 85 ¹⁴ - 91.6 ⁸⁰	124.59 ⁸⁰ 123.7 ¹⁴ 123.4 ¹⁴ 121.5 to 122 ¹⁶⁷ 121.5 ¹²⁴ 120.5 ²³ @ 755mm	0.7671 ²³ 0.773 ¹²⁴ 0.7759 ¹⁶⁷ 0.78271 ⁸⁰ 0.781 ¹⁴ @ 15° 0.795 ¹⁴ @ 15° 0.7952 ¹⁸ @ 15° 0.79925 ⁸⁰ @ 0° 0.8075 ¹⁸ @ 0°	1.42300 ¹²⁴ 1.4257 ¹⁶⁷ 1.42064 ²³ n _{H_a} ²⁰ 1.42833 ²³ n _{H_β} ²⁰ 1.43299 ²³ n _{H_γ} ²⁰ 1.42270 ²³ n _{H_δ} ²⁰ 1.42425 ⁸⁰ n _{H_{e,r}} ^{26.4} 1.42755 ⁸⁰ n _{H_{e,r}} ^{18.8} 1.42700 ⁸⁰ n _{H_{e,u}} ^{26.4} 1.43029 ⁸⁰ n _{H_{e,u}} ^{18.8} 1.43568 ⁸⁰ n _{H_{e,g}} ^{26.4} 1.43917 ⁸⁰ n _{H_{e,g}} ^{18.8}	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
trans-1,4-Dimethyl- cyclohexane	-33.34	119.63 ⁸⁰	0.7620 ⁸⁰	1.42095 ¹²⁴	
	¹²⁴	119.5 ¹²⁴	@ 22°	1.4224 ¹⁶⁷	
	-37.2 ⁸⁰	120.07 to	0.7672 ⁷¹	1.4248 ⁷¹	
		120.67 ⁷¹	@ 20.5°	1.41833 ²³	
		120 to 121 ¹⁶⁷	0.76264 ⁸⁰	n _{H_a} ²⁰	
		119.0 to	0.7638 ²³	1.41914 ²³	
		119.5 ²³	0.7655 ²³	n _{H_a} ²⁰	
		119 ²³	0.7688 ¹⁶⁷	1.42578 ²³	
		118.6 to	0.769 ¹²⁴	n _{H_β} ²⁰	
		119 ⁸⁰	0.77913 ⁸⁰	1.42686 ²³	
		@ 728mm	@ 0°	n _{H_β} ²⁰	
				1.43046 ²³	
				n _{H_γ} ²⁰	
				1.43163 ²³	
				n _{H_γ} ²⁰	
				1.42000 ²³	
				n _{H_δ} ²⁰	
				1.42120 ²³	
				n _{H_δ} ²⁰	
				1.41566 ⁸⁰	
				n _{H_ε} ^{20.4}	
				1.41887 ⁸⁰	
				n _{H_ε} ^{19.8}	
				1.41827 ⁸⁰	
				n _{H_ε} ^{20.4}	
				1.42160 ⁸⁰	
				n _{H_ε} ^{19.8}	
				1.42697 ⁸⁰	
				n _{H_ε} ^{20.4}	
				1.43033 ⁸⁰	
				n _{H_ε} ^{19.8}	

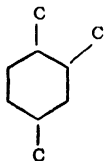
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,4-Dimethyl- cyclohexane	-32 to	120 to 120.2	0.7620 ²⁷	1.4224 ¹⁶²	
	-33 ²⁷	@ 768mm ²⁷	@ 22.2°	1.42326 ⁶⁸	
	-59 ²⁷	122.7 to 123 ¹⁷	0.7669 ⁶⁸	1.4240 ³	
		122.0 to	0.7690 ¹⁶⁹	1.4244 ¹⁶⁹	
		124.0 ¹¹⁸	0.7727 ^{24,30a}	1.4253 ^{24,30a}	
		121.7 ²⁴	0.777 ¹¹⁸	1.4271 ¹¹⁸	
		120.5 to	D_{20}^{20}	1.42597 ³	
		121 ¹⁶²	0.7722 ³	@ 15.7°	
		120 ¹¹²	@ 15.7°	1.4299 ¹²⁷	
		119.5 to	0.7767 ^{24,30a}	@ 11°	
		120.5 ^{3,127}	@ 15°	1.41835 ²⁷	
		119.5 to	0.783 ¹⁷	n_{H_a}	
		120 ¹⁶⁹	@ 15°	1.42407 ³	
		119 ¹⁰⁶	0.7819 ¹²⁷	n_{H_a}	
		119.5 to	@ 11°	1.42592 ²⁷	
		120 ⁶⁸	0.7866 ¹¹²	n_{H_β}	
		@ 740mm	@ 0°	1.43174 ³	
			0.7861 ¹⁰⁶	n_{H_β}	
			D_0^0	1.43035 ²⁷	
				n_{H_γ}	
				1.43624 ³	
				n_H	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Propylcyclohexane 	-94.5 ¹²⁴	154.7 155.7 ^{24,37} 155 ⁸ 154.9 to 155.0 ¹¹⁸ 154 to 155 ⁶⁸ 153 to 154 ^{68,111,112,127} 140 to 142 ¹³⁸ 154.5 to 155.5 ²³ @ 756mm 153 to 154 ⁶⁵ @ 753mm 155 to 156 ⁶⁵ @ 730mm	0.7932 0.791 ⁸ @ 21° 0.7898 ²³ 0.7929 ^{24,30a} 0.7930 ⁶⁸ 0.7946 ⁶⁶ 0.7971 ⁶⁸ 0.793 ¹¹⁸ D_{20}^{20} 0.7968 ^{24,30a} @ 15° 0.796 ⁸ @ 13° 0.8025 ¹²⁷ @ 11° 0.7819 ¹³⁸ @ 0° 0.8091 ¹¹² @ 0° 0.8098 ¹¹¹ @ 0°	1.4371 1.437 ⁸ @ 21° 1.4360 ^{24,30a} 1.43690 ⁶⁸ 1.4370 ¹¹⁸ 1.4374 ⁶⁶ 1.4382 ⁶⁵ 1.440 ⁸ @ 13° 1.4449 ¹²⁷ @ 11° 1.43383 ²³ $n_{H_a}^{20}$ 1.44160 ²³ $n_{H_\beta}^{20}$ 1.44616 ²³ $n_{H_\gamma}^{20}$ 1.43592 ²³ $n_{H_e}^{20}$	$\frac{dD}{dt} = -0.000757/^\circ\text{C.}$ (0° to 20°)
Isopropylcyclohexane 	-89.8 ¹²⁶	154.7 ¹³³ 154.5 ¹²⁸ 151.7 to 153.0 ¹¹⁸ 151 to 153 ¹²⁷ 150 to 153 ⁷⁵ 147 to 150 ¹⁶² 146 to 148 ¹¹² 152 to 153 ²³ @ 756mm	0.787 ¹⁶² 0.7902 ²³ 0.799 ¹¹⁸ D_{20}^{20} 0.8090 ¹²⁷ @ 11° 0.812 ¹¹² @ 0°	1.4410 ¹²⁶ 1.4411 ¹¹⁸ 1.4444 ¹²⁷ @ 11° 1.43428 ²³ $n_{H_a}^{20}$ 1.44225 ²³ $n_{H_\beta}^{20}$ 1.44686 ²³ $n_{H_\gamma}^{20}$ 1.43642 ²³ $n_{H_e}^{20}$	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Methyl-2-ethyl-cyclohexane 		152.6 to 154.7 ¹¹⁸ 151 ⁸⁴ 150 to 152 ⁴⁰	0.784 ⁸⁴ 0.805 ¹¹⁸ D_{20}^{20} 0.7945 ⁸⁴ @ 0°	1.432 ⁸⁴ 1.4400 ¹¹⁸	
1-Methyl-3-ethyl-cyclohexane 		148.4 to 150 ¹¹⁸ 145 to 146 ⁷⁰	0.8213 ⁷⁰ 0.791 ¹¹⁸ D_{20}^{20} 0.8320 ⁷⁰ @ 0°	1.4311 ⁸³ 1.4344 ¹¹⁸ 1.460 ⁷⁰	
<i>l</i>-1-Methyl-3-ethyl-cyclohexane		148 to 149 ¹⁴⁸ @ 743mm	0.7896 ¹⁴⁸ @ 17°	1.4353 ¹⁴⁸ @ 17°	
1-Methyl-4-ethyl-cyclohexane 		150.1 to 151 ¹¹⁸ 150 ¹¹² 147 ¹⁰⁷	0.791 ¹¹⁸ D_{20}^{20} 0.7884 ¹⁰⁷ @ 15° 0.8041 ¹¹² @ 0°	1.4343 ¹¹⁸ 1.435 ¹⁰⁷ @ 15°	

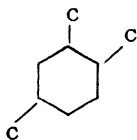
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,1,3-Trimethyl- cyclohexane 		138.5 to 139 ⁴⁵ 137 to 138 ^{3,49} 134.8 to 135 ¹³⁰	0.7866 ³ @ 25.3° 0.7663 ⁴⁵ 0.7703 ⁴⁵ @ 15° 0.7848 ⁴⁹ @ 15°	1.43385 ³ @ 25.3° 1.4327 ⁴⁵ @ 17° 1.4237 ⁴⁵ @ 15° 1.4324 ⁴⁹ @ 15° 1.43177 ³ n _{H_a} ²⁰ 1.43998 ³ n _{H_β} ²⁰ 1.44453 ³ n _{H_γ} ²⁰	
cis-1,2,3-Trimethyl- cyclohexane (Hexahydrohemimellitene) 		144 to 146 ²³ @ 755mm	0.7930 ²³	1.43475 ²³ n _{H_a} ²⁰ 1.44259 ²³ n _{H_β} ²⁰ 1.44724 ²³ n _{H_γ} ²⁰ 1.43682 ²³ n _{H_δ} ²⁰	

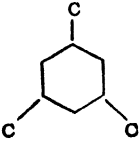
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
trans-1,2,3-Trimethyl- cyclohexane (Two possible <i>trans</i> isomers)		142 to 143.5 ²³ @ 762mm 141 ¹⁶⁵ @ 736mm	0.7898 ¹⁶⁵ 0.7914 ²³	1.4346 ¹⁶⁵ 1.43373 ²³ n _{H_a} ²⁰ 1.44150 ²³ n _{H_β} ²⁰ 1.44606 ²³ n _{H_γ} ²⁰ 1.43582 ²³ n _{H_δ} ²⁰	
cis-1,2,4-Trimethyl- cyclohexane (Hexahydropseudocumene)		146 ¹²⁴ 144.8 to 145.8 ¹²⁰ 141.5 ^{23,27} 33 @ 11mm ¹²⁰	0.7850 ²³ 0.790 ^{120,124} 0.7848 ²⁷ @ 16.7°	1.43314 ¹²⁴ 1.434 ¹²⁰ 1.43120 ²³ n _{H_δ} ²⁰ 1.43902 ²³ n _{H_β} ²⁰ 1.44361 ²³ n _{H_γ} ²⁰ 1.43341 ²³ n _{H_δ} ²⁰	



<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
1',2',4'-Trimethyl- cyclohexane		138.5 to 139.5 ²³ @ 755mm	0.7813 ²³	1.42909 ²³ <i>n_{H_a}²⁰</i> 1.43675 ²³ <i>n_{H_β}²⁰</i> 1.44135 ²³ <i>n_{H_γ}²⁰</i> 1.43121 ²³ <i>n_{H_δ}²⁰</i>	
1^c,2^c,4'-Trimethyl- cyclohexane		142 ¹²⁴	0.786 ¹²⁴	1.43209 ¹²⁴	
1^c,2',4'-Trimethyl- cyclohexane		140 ¹²⁴	0.774 ¹²⁴	1.42916 ¹²⁴	

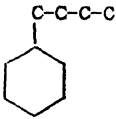
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,2,4-Trimethyl- cyclohexane		145 to 146 ¹¹¹ 143 to 144 ¹¹² 142 to 144 ¹⁷¹ 140 ³⁰ 138 ⁵³ 135 to 136 ⁷⁴ 141.5 to 143 ²⁷ @ 759mm 143 to 144 ²⁷ @ 759mm	0.7652 ⁷⁴ 0.7667 ⁵³ 0.778 ³⁰ 0.7808 ⁷⁴ 0.7807 ¹⁷¹ @ 18° 0.7850 ²⁷ @ 16.6° 0.7812 ⁵³ @ 0° 0.8052 ¹¹² @ 0°	1.429 ³⁰ 1.4344 ³² @ 13.5° 1.43054 ²⁷ $n_{H_a}^{16.7}$ 1.42962 ²⁷ $n_{H_a}^{16.6}$ 1.43829 ²⁷ $n_{H_\beta}^{16.7}$ 1.43733 ²⁷ $n_{H_\beta}^{16.6}$ 1.44281 ²⁷ $n_{H_\gamma}^{16.7}$ 1.44187 ²⁷ $n_{H_\gamma}^{16.6}$	
1,2,5-Trimethylcyclo- hexane		140 to 141 ³	0.7799 ³ @ 16.9°	1.43056 ³ @ 16.9° 1.42860 ³ $n_{H_a}^{20}$ 1.43632 ³ $n_{H_\beta}^{20}$ 1.44099 ³ $n_{H_\gamma}^{20}$	

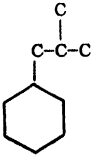
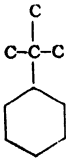
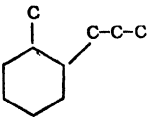


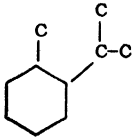
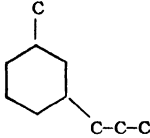
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
cis-1,3,5-Trimethyl- cyclohexane (Hexahydromesitylene) 		140.0 to 140.5 ²³ @ 752mm 139.5 to 140.5 ²³ @ 750mm	0.7765 ²³ 0.7773 ²³	1.42768 ²³ $n_{H_a}^{20}$ 1.42808 ²³ $n_{H_a}^{20}$ 1.43536 ²³ $n_{H_\beta}^{20}$ 1.43586 ²³ $n_{H_\beta}^{20}$ 1.43990 ²³ $n_{H_\gamma}^{20}$ 1.44028 ²³ $n_{H_\gamma}^{20}$ 1.42990 ²³ $n_{H_e}^{20}$ 1.43010 ²³ $n_{H_e}^{20}$	

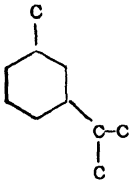
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<i>trans</i> -1,3,5-Trimethyl- cyclohexane		138 to 139 ²³ @ 761mm 138.5 to 139 ²³ @ 754mm	0.7720 ²³	1.42506 ²³ $n_{H_a}^{20}$ 1.42526 ²³ $n_{H_a}^{20}$ 1.43279 ²³ $n_{H_\beta}^{20}$ 1.43288 ²³ $n_{H_\beta}^{20}$ 1.43725 ²³ $n_{H_\gamma}^{20}$ 1.43735 ²³ $n_{H_\gamma}^{20}$ 1.42710 ²³ $n_{H_e}^{20}$ 1.42740 ²³ $n_{H_e}^{20}$	

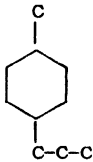
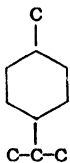
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,3,5-Trimethyl- cyclohexane		140 to 142 ¹¹¹	0.7521 ⁴⁸	1.4304 ⁴⁸	
		139.3 to	@ 25.5°	@ 21°	
		141.4 ¹¹⁸	0.7590 ⁹³	1.4212 ⁹³	
		138 ⁵³	0.7666 ⁵³	1.42688 ⁵³	
		137.5 ³	0.7711 ⁶⁸	1.4316 ¹¹⁸	
		137 to	0.777 ¹¹⁸	1.4320 ¹⁰	
		139 ^{110,112}	D_{20}^{20}	1.42597 ³	
		136 to 140 ⁴⁸	0.7744 ²⁷	@ 15.7°	
		136 to 137 ²⁷	@ 15.7°	1.42407 ³	
		135 to 137 ⁹³	0.7777 ³	$n_{H_a}^{15.7}$	
		134 to 136 ¹⁰	@ 13.1°	1.42683 ²⁷	
		137 to 139 ⁶⁸	0.7784 $\left\{ \begin{array}{l} 110. \\ 111. \\ 112 \end{array} \right.$	$n_{H_a}^{15.7}$	
		@ 752mm		1.43174 ³	
				$n_{H_\beta}^{15.7}$	
			0.7811 ⁵³	1.43460 ²⁷	
			@ 0°	$n_{H_\beta}^{15.7}$	
				1.43624 ³	
				$n_{H_\gamma}^{15.7}$	
				1.43916 ²⁷	
				$n_{H_\gamma}^{15.7}$	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Butylcyclohexane 	-78.6 ¹³³	179 177 to 178 ⁶⁹ @ 763.5mm 180.5 ^{24,30a} 180.1 to 181.2 ¹¹⁸ 178 to 182 ²¹ 177 ⁸ 176.5 to 178.5 ¹²⁷ 176 to 177 ⁶⁴ @ 755mm 68 @ 16mm ⁸	0.7997 0.797 ⁸ 0.7987 ⁶⁴ 0.7996 ⁶⁹ 0.8005 ^{24,30a} 0.8178 ²¹ 0.799 ¹¹⁸ D ₂₀ ²⁰ 0.8037 ^{24,30a} @ 15° 0.8078 ¹²⁷ @ 11° 0.8305 ²¹ @ 0°	1.4412 1.440 ⁸ 1.44076 ⁶⁹ 1.4408 ¹¹⁸ 1.4410 ^{24,30a} 1.4426 ⁶⁴ 1.4449 ¹²⁷ @ 11°	$\frac{dD}{dt} = -0.000858/^\circ\text{C.}$ (10° to 20°) $\frac{dn}{dt} = -0.000413/^\circ\text{C.}$ (10° to 20°)
d-2-Cyclohexylbutane (d-sec-Butylcyclohexane)		176 to 178 ⁶⁹ 174 ⁶⁰ 63 @ 15mm ⁶⁰	0.805 ⁶⁰ @ 27° 0.810 ⁶⁰ @ 22° 0.815 ⁶⁹ D ₂₀ ²⁰	1.4460 ⁶⁹	$[\alpha]_D^{20} = +0.79^\circ$ ⁶⁰ $[\alpha]_D^{27} = +0.45^\circ$ ⁶⁰
2-Cyclohexylbutane (sec-Butylcyclohexane)		178.5 to 179.5 ¹¹⁸ 177.2 ¹³³ 172 to 174.5 ¹²⁷	0.811 ¹¹⁸ D ₂₀ ²⁰ 0.8156 ¹²⁷ @ 11°	1.4458 ¹¹⁸ 1.4487 ¹²⁷ @ 11°	

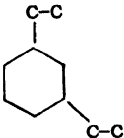

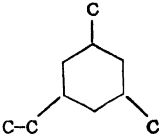
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-1-cyclohexylpropane <i>(iso-Butylcyclohexane)</i> 		170.8 to 171.7 ¹¹⁸ 169 ²³ @ 754mm	0.7950 ²³ 0.797 ¹¹⁸ D ₂₀ ²⁰	1.4391 ¹¹⁸ 1.43686 ²³ n _{H_a} ²⁰ 1.44467 ²³ n _{H_β} ²⁰ 1.44920 ²³ n _{H_γ} ²⁰ 1.43904 ²³ n _{H_e} ²⁰	
2-Methyl-2-cyclohexylpropane <i>(tert-Butylcyclohexane)</i> 		169.9 to 171.4 ¹¹⁸ 167 to 169 ¹²⁷ 166 to 167 ³⁵	0.813 ¹¹⁸ D ₂₀ ²⁰ 0.8305 ³⁵ @ 16° 0.8205 ¹²⁷ @ 11°	1.4464 ¹¹⁸ 1.45562 ³⁵ @ 16° 1.4538 ¹²⁷ @ 11°	
1-Methyl-2-propylcyclohexane 		175.2 to 177.0 ¹¹⁸ 171 to 172.5 ⁶⁹ 175.5 to 176 ⁵⁴ @ 755.5mm 56 @ 13mm ⁵⁴	0.8064 ⁶⁹ 0.810 ¹¹⁸ D ₂₀ ²⁰ 0.8130 ⁵⁴ @ 19°	1.44378 ⁶⁹ 1.4445 ¹¹⁸ 1.4468 ⁵⁴	

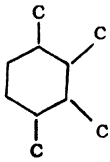
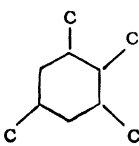
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Methyl-2-isopropyl- cyclohexane (o-Hexahydrocymene) 		171 ¹⁰⁹	0.8134 ¹⁰⁹ D_0^{21} 0.8326 ¹⁰⁹ D_0^0	1.447 ¹⁰⁹ @ 21°	
d-1-Methyl-2-isopropylcyclohexane		169 to 170 ¹⁴⁹ @ 752mm	0.8297 ¹⁴⁹	1.45649 ¹⁴⁹	$[\alpha]_D = +14.9^\circ$ ¹⁴⁹
1-Methyl-3-propyl- cyclohexane 		171.1 to 173.0 ¹¹⁸ 169 to 170 ¹⁶⁴ 164 to 165 ⁷⁰	0.7895 ¹⁶¹ @ 21° 0.796 ¹¹⁸ D_{30}^{20}	1.4352 ¹⁶⁴ @ 21° 1.4377 ¹¹⁸	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-3-isopropyl- cyclohexane (<i>m</i> -Hexahydrocymene) 		166 to 168 ¹¹¹ 166 to 167 ¹⁰⁹ 167 to 168 ⁸² @ 756mm	0.7965 ¹⁰⁹ @ 24° 0.8033 ¹¹¹ @ 14°	1.440 ¹⁰⁹ @ 24° 1.44204 ⁸²	
<i>d</i>-1-Methyl-3-isopropylcyclohexane		167 to 168 ¹⁰⁹ 168 to 168.5 ⁴⁴ @ 758mm	0.7948 ⁴⁴ D ₀ ²⁰ 0.8235 ¹⁰⁹ D ₀ ²⁰	1.446 ¹⁰⁹ @ 23° 1.4380 ⁴⁴	[α] _D ²³ = +1.60° ¹⁰⁹ [α] _D ²⁰ = +0.45° ⁴⁴
<i>l</i>-1-Methyl-3-isopropylcyclohexane		167.5 to 168 ⁴⁷ @ 749mm	0.7938 ⁴⁷ D ₀ ²⁰ 0.8078 ⁴⁷ D ₀ ²⁰	1.4358 ⁴⁷	[α] _D ²⁰ = -0.28° ⁴⁷

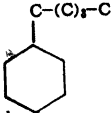
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-propyl- cyclohexane 		168 to 169 ⁶⁹ @ 765mm 174.3 to 177.1 ¹¹⁸	0.7941 ⁶⁹ 0.798 ¹¹⁸ D ₂₀ ²⁰	1.43884 ⁶⁹ 1.4393 ¹¹⁸	
cis-1-Methyl-4-iso- propylcyclohexane (<i>p</i> -Hexahydrocymene) 		168.5 ¹²⁴	0.816 ¹²⁴	1.45149 ¹²⁴	
trans-1-Methyl-4-iso- propylcyclohexane		161.0 ¹²⁴	0.792 ¹²⁴	1.43931 ¹²⁴	

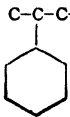
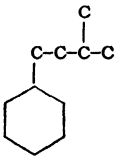
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-isopropyl- cyclohexane		171 to 172 ⁹⁶	0.7448 ²⁵	1.4370 ¹	
		171 ²⁵	@ 79.2°	@ 25°	
		170 to 172 ¹²⁵	0.8061 ¹	1.440 ¹⁰⁹	
		170 ⁸²	@ 25°	@ 25°	
		169 to 171 ⁵³	0.8020 ¹⁰⁹	1.4375 ⁴⁶	
		169 to 170.5 ⁷	D ₅ ²⁵	1.43757 ⁵³	
		169 to 170 ¹¹²	0.7904 ²⁵	1.4380 ¹²⁵	
		169 ¹⁴¹	@ 20.1°	1.43840 { ^{22.} ⁶⁸	
		168 to 170 ¹¹²	0.790 ⁵³	1.4385 ⁹⁶	
		168 to 169 ¹⁴⁶	0.7930 ⁵³	1.44187 ¹⁴⁹	
		167 to 168 ¹⁰⁹	0.7960 ^{22,68}	1.40789 ²⁵	
		166 to 168 ¹¹¹	0.7963 ⁴⁶	n _H ^{79,2} ¹¹	
		165 to 169 ⁵⁵	0.7974 ¹²⁵	1.43418 ²⁵	
		171 ⁴⁶	0.7990 ⁹⁶	n _H ^{20,1} ^a	
		@ 759mm	0.8039 ¹⁴⁹	1.43458 ²⁵	
		169 ⁹¹	0.7904 ²⁵	n _H ^{19,9} ^a	
		@ 758mm	@ 19.9°	1.41521 ²⁵	
		169.5 to 170 ⁵³	0.8060 ⁸²	n _H ^{79,2} ^β	
		@ 754mm	@ 17.5°	1.44196 ²⁵	
		169 ¹⁵³	0.796 ⁷	n _H ^{20,1} ^β	
		@ 752mm	D ₁₅ ¹⁵	1.44234 ²⁵	
		169 ¹⁴⁹	0.803 ¹⁴¹	n _H ^{19,9} ^γ	
		@ 747mm	D ₁₅ ¹⁵	1.41954 ²⁵	
		166 to 168 ^{22,68}	0.8056 ⁵³	n _H ^{20,1} ^γ	
		@ 746mm	@ 0°	1.44651 ²⁵	
		63 @ 22mm ¹	0.8132 ¹¹²	n _H ^{79,2} ^γ	
			@ 0°	1.44694 ²⁵	
			0.8179 ⁸²	n _H ^{20,1} ^γ	
			@ 0°	1.44651 ²⁵	
			0.8066 ¹⁴⁶	n _H ^{19,9} ^γ	
			D ₅ ⁰		
			0.8067 ⁷		
			D ₅ ⁰		
			0.8134 ¹⁰⁹		
			D ₅ ⁰		

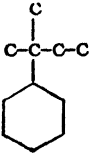
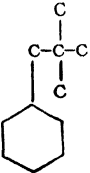
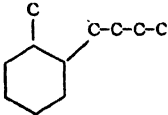
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,3-Diethylcyclohexane 		173.5 to 174.5 ¹¹⁸ 169 to 173 ¹²⁷ 169 to 171 ¹⁷²	0.7957 ¹⁷² @ 22° 0.800 ¹¹⁸ D ₂₀ ²⁰ 0.8118 ¹²⁷ @ 11°	1.4388 ¹⁷² 1.4409 ¹¹⁸ 1.4449 ¹²⁷ @ 11°	
1,4-Diethylcyclohexane 		174.6 to 176.4 ¹¹⁸	0.802 ¹¹⁸ D ₂₀ ²⁰	1.4415 ¹¹⁸	
1,3-Dimethyl-5-ethyl- cyclohexane 		168.5 to 170 ¹²⁹ 168 to 170 ¹⁰⁰	0.7929 ¹²⁹ D ₀ ²⁰ 0.796 ¹⁰⁰ D ₁₈ ¹⁸ 0.8073 ¹²⁹ D ₀ ⁰ 0.8076 ¹⁰⁰ D ₀ ⁰		

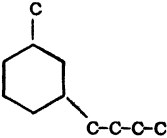
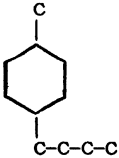
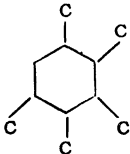
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2,3,4-Tetramethylcyclohexane (Hexahydroprehnitene) 		84 @ 5mm ⁸¹	0.8219 ⁸¹	1.4531 ⁸¹	
cis-1,2,3,5-Tetramethylcyclohexane (Hexahydroisodurene) 		168 to 170 ²³ @ 762mm	0.8166 ²³	1.44621 ²³ <i>n</i> _{H_a} ²⁰ 1.45472 ²³ <i>n</i> _{H_β} ²⁰ 1.45963 ²³ <i>n</i> _{H_γ} ²⁰ 1.44847 ²³ <i>n</i> _{H_δ} ²⁰	
trans-1,2,3,5-Tetramethylcyclohexane (Several possible <i>trans</i> isomers)		162 to 164 ²³ @ 765mm	0.8140 ²³	1.44440 ²³ <i>n</i> _{H_a} ²⁰ 1.45212 ²³ <i>n</i> _{H_β} ²⁰ 1.45667 ²³ <i>n</i> _{H_γ} ²⁰ 1.44657 ²³ <i>n</i> _{H_δ} ²⁰	

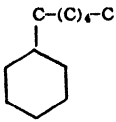
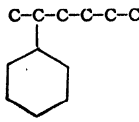
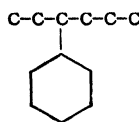
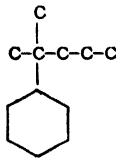
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
cis-1,2,4,5-Tetra- methylcyclohexane (Hexahydrodurene) 		171 ²³ @ 755mm	0.8122 ²³	1.44420 ²³ <i>n</i> _{H_a} ²⁰ 1.45252 ²³ <i>n</i> _{H_β} ²⁰ 1.45756 ²³ <i>n</i> _{H_γ} ²⁰ 1.44647 ²³ <i>n</i> _{H_δ} ²⁰	
trans-1,2,4,5-Tetra- methylcyclohexane (Several possible <i>trans</i> isomers)		166 to 168 ²³	0.8100 ²³	1.44230 ²³ <i>n</i> _{H_a} ²⁰ 1.45003 ²³ <i>n</i> _{H_β} ²⁰ 1.45470 ²³ <i>n</i> _{H_γ} ²⁰ 1.44446 ²³ <i>n</i> _{H_δ} ²⁰	

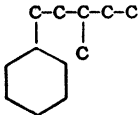
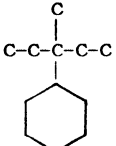
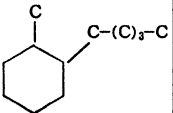
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2,4,5-Tetramethyl- cyclohexane		160.5 to 161.5 ³ 160 to 161.5 ^{22,68} @ 755mm 172 to 174 ⁹² @ 730mm 169 to 170.5 ¹⁵¹ @ 711mm	0.7578 ^{22,68} @ 70° 0.7765 ⁹² @ 23° 0.7934 ²² 0.811 ¹⁵¹ 0.7910 ³ @ 13.1° 0.825 ¹⁵¹ @ 0°	1.4299 ^{22,68} @ 40° 1.4196 ⁹² @ 23° 1.43717 { ^{22,68} 1.44511 ¹⁵¹ 1.43718 ³ @ 13.1° 1.44260 ¹⁵¹ n _{H_a} ²⁰ 1.43517 ³ n _{H_a} ^{13.1} 1.45064 ¹⁵¹ n _{H_β} ²⁰ 1.44307 ³ n _{H_β} ^{13.1} 1.45524 ¹⁵¹ n _{H_γ} ²⁰ 1.44772 ³ n _{H_γ} ^{13.1}	
C ₁₁ H ₂₂ Pentylcyclohexane 		201.4 to 201.9 ¹¹⁸ 199 ⁸ 194.5 to 198 ¹²⁷ 191 to 192 ³⁵ 197 to 199 ⁶⁹ @ 754mm 84 to 85 ⁸ @ 16mm	0.802 ⁸ 0.8044 ⁶⁹ 0.804 ¹¹⁸ D ₂₀ ²⁰ 0.823 ³⁵ @ 16° 0.8160 ¹²⁷ @ 11°	1.4428 ¹¹⁸ 1.444 ⁸ 1.44428 ⁶⁹ 1.454 ³⁵ @ 16° 1.4466 ¹²⁷ @ 11°	

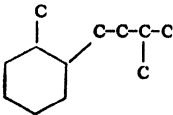
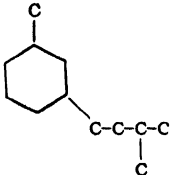
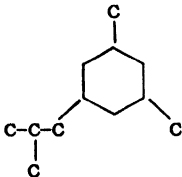
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-2-Cyclohexylpentane 		101 ⁶⁰ @ 18mm 88 ⁶⁰ @ 15mm	0.814 ⁶⁰ @ 27° 0.823 ⁶⁰ @ 25°		$[\alpha]_D^{27} = -0.81^\circ$ ⁶⁰
d-2-Methyl-1-cyclohexylbutane (d-[2-Methylbutyl]-cyclohexane)		191 ⁶¹	0.805 ⁶¹ @ 25°		$[\alpha]_D^{25} = +3.04^\circ$ ⁶¹
3-Methyl-1-cyclohexylbutane 		192.5 to 193 ⁶⁰ @ 774mm 193.8 to 195.2 ¹¹⁸ 190 to 194 ¹²⁷ 190 to 191 ⁶⁶	0.8023 ⁶⁰ 0.8235 ⁶⁰ 0.800 ¹¹⁸ D ₂₀ ²⁰ 0.8136 ¹²⁷ @ 11°	1.4420 ¹¹⁸ 1.44233 ⁶⁰ 1.58125 ⁶⁶ 1.4477 ¹²⁷ @ 11°	

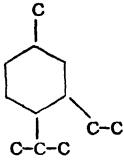
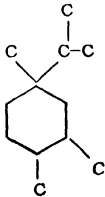
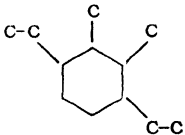
Name and Carbon Skeleton	M. P., °C.	B. P., °C @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-2-cyclohexylbutane 		193.3 to 195.2 ¹¹⁸ 191 to 192 ³⁵	0.821 ¹¹⁸ D ₂₀ ²⁰ 0.8226 ³⁵ @ 16°	1.4510 ¹¹⁸ 1.4538 ^{35, 118} @ 16°	
2,2-Dimethyl-1-cyclohexylpropane 			0.78352 ⁹⁴ @ 40° 0.79893 ⁹⁴	1.4416 ⁹⁴ 1.4502 ⁹⁴ @ 0° 1.4631 ⁹⁴ @ -30°	$\frac{dD}{dt} = -0.00077/^\circ\text{C.}$ (20° to 40°) $\frac{dn}{dt} = -0.00043/^\circ\text{C.}$ (-30° to +20°)
1-Methyl-2-butylcyclohexane 		195.6 to 198.1 ¹¹⁸	0.813 ¹¹⁸ D ₂₀ ²⁰	1.4467 ¹¹⁸	

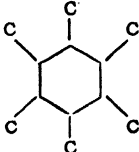
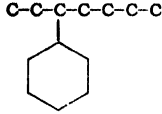
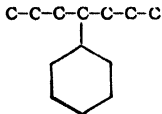
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-3-butyl-cyclohexane 		194.8 to 195.2 ¹¹⁸	0.801 ¹¹⁸ D ₂₀ ²⁰	1.4418 ¹¹⁸	
1-Methyl-4-butyl-cyclohexane 		195.9 to 196.6 ¹¹⁸	0.807 ¹¹⁸ D ₂₀ ²⁰	1.4441 ¹¹⁸	
Pentamethyl-cyclohexane 		180 to 185 ¹²⁷ 183 to 186 ⁶⁸ @ 752mm	0.7990 ⁶⁸ @ 50° 0.8200 ⁶⁸ 0.8081 ¹²⁷ @ 11°	1.43848 ⁶⁸ @ 50° 1.44995 ⁶⁸ 1.4455 ¹²⁷ @ 11°	

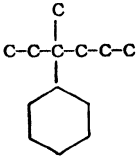
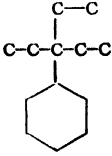
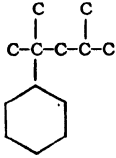
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Hexylcyclohexane 		221 ° 219 to 221 ° ⁸⁶ 102 ° @ 16mm	0.8239 ° ⁸⁶ 0.806 ° ⁸	1.446 ° ⁸ 1.45222 ° ⁸⁶	
1-2-Cyclohexylhexane 		101 ° ⁶⁰ @ 18mm	0.823 ° ⁶⁰ @ 25°		[α] _D ²⁵ = -0.90° ° ⁶⁰
d-3-Cyclohexylhexane 		111 ° ⁶⁰ @ 28mm	0.823 ° ⁶⁰ @ 23°		[α] _D ²⁵ = +0.57° ° ⁶⁰
2-Methyl-2-cyclohexylpentane 		206 to 207 ° ³⁵	0.8372 ° ³⁵ @ 16°	1.4670 ° ³⁵ @ 16°	

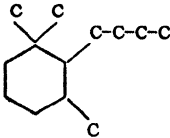
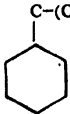
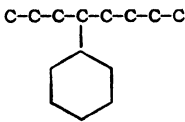
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-3-Methyl-1-cyclohexylpentane 		110 ⁶² @ 15mm	0.806 ⁶² @ 27°		$[\alpha]_D^{25} = -1.68^\circ$ ⁶³
3-Methyl-3-cyclohexylpentane 		207 to 208 ³⁵	0.8310 ³⁵ @ 16°	1.4574 ³⁶ @ 16°	
1-Methyl-2-pentyl-cyclohexane 		215.8 to 219.1 ¹¹⁸	0.816 ¹¹⁸ D_{20}^{20}	1.4487 ¹¹⁸	

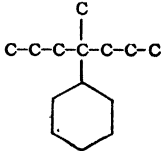
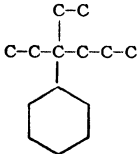
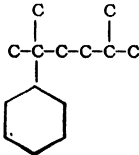
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-2-(3-methyl-butyl)-cyclohexane 		204 ^u	0.812 ^u @ 17° 0.825 ^u @ 0°	1.454 ^u @ 17°	
1-Methyl-3-(3-methyl-butyl)-cyclohexane 		205 ⁷⁰			
1,3-Dimethyl-5-(2-methylpropyl)-cyclohexane 		193 to 195 ¹¹⁰	0.8227 ¹¹⁰ @ 0°		

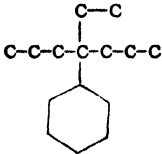
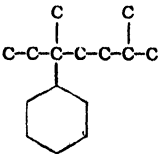
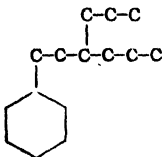
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Methyl-3-ethyl-4-isopropylcyclohexane 		207 to 208 ⁴⁴ @ 736mm	0.8159 ⁴⁴ 0.8275 ⁴⁴ @ 0°		$[\alpha]_D = -12.25^\circ$ ⁴⁴
1,3,4-Trimethyl-1-isopropylcyclohexane 		177 ²⁸	0.8375 ²⁸	1.4636 ²⁸	
1,2-Dimethyl-3,6-diethylcyclohexane 		91 to 92 ⁸¹ @ 4mm	0.8536 ⁸¹	1.4673 ⁸¹	

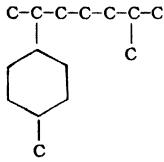
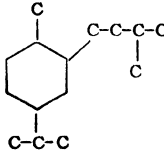
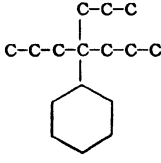
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Hexamethyl- cyclohexane (Hexahydromellitene) 		210 to 214 ^{22.68}	0.8405 ^{22.68}	1.4606 ^{22.68}	
C₁₁H₂₄ 1-3-Cyclohexyl- heptane 		112 ⁸⁰ @ 15mm	0.819 ⁸⁰ @ 25°		[α] _D ²⁵ = -0.68°
4-Cyclohexylheptane 		228 ^{2.108}			

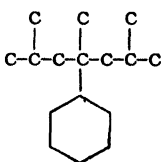
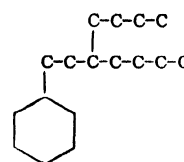
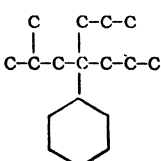
<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
3-Methyl-3-cyclohexylhexane 		224 to 226 ³⁵	0.8406 ³⁵ @ 16°	1.4646 ³⁵ @ 16°	
3-Ethyl-3-cyclohexylpentane 		222 to 223 ³⁵	0.8388 ³⁵ @ 16°	1.4658 ³⁵ @ 16°	
2,4-Dimethyl-2-cyclohexylpentane 		220 to 221 ³⁵	0.8304 ³⁵ @ 16°	1.4580 ³⁵ @ 16°	

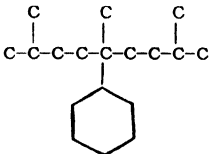
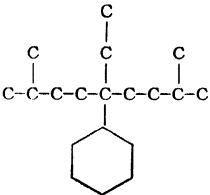
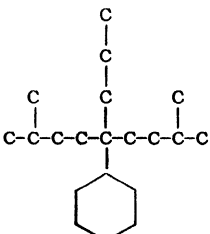
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,1,3-Trimethyl-2-butylcyclohexane 		94 to 95 ¹⁰¹ @ 10mm	0.8292 ¹⁰¹ @ 19°	1.4563 ¹⁰¹ @ 19°	
C₁₄H₂₈ Octylcyclohexane 		117 to 119 ⁶⁹ @ 11mm	0.8150 ⁶⁹	1.45070 ⁶⁹	
1-4-Cyclohexyloctane 		123 ⁶⁰ @ 15mm	0.823 ⁶⁰ @ 27°		

<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
4-Methyl-4-cyclohexylheptane 		115 to 116 ³⁵ @ 13mm	0.8483 ³⁵ @ 19°	1.4717 ³⁵ @ 19°	
3-Ethyl-3-cyclohexylhexane 		114 to 116 ³⁵ @ 13mm	0.8547 ³⁵ @ 19°	1.4754 ³⁵ @ 23°	
2,5-Dimethyl-2-cyclohexylhexane 		134 to 135 ³⁵ @ 30mm	0.8512 ³⁵ @ 19°	1.4685 ³⁵ @ 23°	

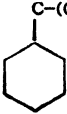
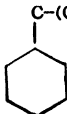


Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
4-Ethyl-4-cyclohexylheptane 		129 to 130 ³⁵ @ 13mm	0.8376 ³⁵ @ 19°	1.4598 ³⁵ @ 23°	
3,6-Dimethyl-3-cyclohexylheptane 		120 to 121 ³⁵ @ 10mm	0.8717 ³⁵ @ 19°	1.4871 ³⁵ @ 23°	
3-Propyl-1-cyclohexylhexane 		83 to 85 ⁸⁷ @ 2mm	0.8285 ⁸⁷	1.4550 ⁸⁷	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
6-Methyl-2-[4-methyl-cyclohexyl]-heptane (Hexahydrozingiberene) 		125 ¹⁰³ @ 15mm 128 to 130 ¹¹⁴ @ 11mm 123 to 125 ¹¹⁷ @ 8mm	0.8244 ¹¹⁷ 0.8264 ¹¹⁴ 0.829 ¹⁰⁴ 0.828 ¹⁰³ @ 15°	1.45423 ¹¹⁷ 1.4560 ¹¹⁴ 1.4567 ¹⁰⁴	$[\alpha]_D^{20} = -10.2^\circ$ ¹¹⁴
1-Methyl-4-isopropyl-2-(3-methylbutyl)-cyclohexane 		131 to 133 ¹¹⁶ @ 14mm	0.8250 ¹¹⁶ @ 22°	1.45562 ¹¹⁶ @ 22°	
C₁₆H₃₂ 4-Propyl-4-cyclohexyl-heptane 		133 to 135 ⁸⁵ @ 11mm	0.8382 ³⁵ @ 19°	1.4606 ²⁵ @ 23°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,4,6-Trimethyl-4-cyclohexylheptane 		133 to 135 ³⁵ @ 11mm	0.8396 ³⁵ @ 19°	1.4622 ³⁵ @ 23°	
C₁₇H₃₄ 3-Butyl-1-cyclohexylheptane 		95 to 96 ³⁷ @ 2mm	0.8351 ³⁷	1.4648 ³⁷	
2-Methyl-4-propyl-4-cyclohexylheptane 		148 to 150 ³⁵ @ 10mm	0.8441 ³⁵ @ 19°	1.4658 ³⁵ @ 23°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,5,8-Trimethyl-5-cyclohexynonane 		156 to 158 ²⁹ @ 12mm	0.8440 ³⁵ @ 20.5°	1.4666 ³⁵	
C₁₉H₃₈ 2,8-Dimethyl-5-ethyl-5-cyclohexynonane 		162 to 164 ³⁵ @ 10mm	0.8681 ³⁵ @ 20.5°	1.4789 ³⁵	
C₂₀H₄₀ 2,8-Dimethyl-5-propyl-5-cyclohexynonane 		190 to 192 ³⁵ @ 17mm	0.8421 ³⁵ @ 20.5°	1.4646 ³⁵	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-(4-Methylpentyl)-4-(1,5-dimethylhexyl)-cyclohexane 		183 to 186 ¹¹⁵ @ 14mm	0.8331 ¹¹⁵	1.46001 ¹¹⁵	
C₃₁H₄₂ Pentadecylcyclohexane 	25 ³⁴	178 ³⁴ @ 0.7mm	0.8323 ³⁴ @ 19.5°	1.4612 ³⁴	
2,8-Dimethyl-5-isobutyl-5-cyclohexyl-nonane 		162 to 163 ³⁵ @ 6mm	0.8797 ³⁵ @ 20.5°	1.4905 ³⁵	


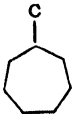
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Octadecylcyclohexane 	41.20 to 41.45 ¹²⁸ 40 ^{76,77} 35 ¹³⁹	207.5 to 208.5 ¹²⁸ @ 3mm	0.834 ⁷⁶ @ 25°	1.4538 ⁷⁶ @ 25°	
C₂₈H₅₆ Cyclohexyldocosane 	49 to 50 ⁷⁶		0.8327 ⁷⁶ @ 25°	1.4643 ⁷⁶ @ 25°	
5-Cyclohexyldocosane 			0.8395 ⁷⁶ @ 25°	1.4627 ⁷⁶ @ 25°	
C₃₂H₆₄ 5-Cyclohexylhexacosane 	30 to 31 ⁷⁶		0.8372 ⁷⁶ @ 25°	1.4677 ⁷⁶ @ 25°	

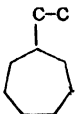
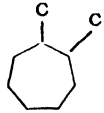
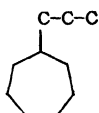
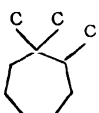
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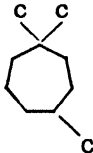
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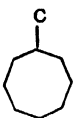
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Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cycloheptane 	- 13 ¹⁰ - 12 to - 13 ¹²	117 to 117.5 ⁴ @ 763mm 119 to 120 ² 118 to 120 ⁷ 117 to 117.3 ⁸ 117.5 to 118 ¹¹ @ 758mm 116 to 118 ⁹ @ 730mm 118 ¹² @ 726mm	0.8100 0.7733 ¹¹ @ 61.0° 0.7905 ¹¹ @ 41.0° 0.8079 ⁹ @ 24° 0.8118 ⁸ 0.811 ¹⁰ 0.8108 ¹² 0.8099 ⁷ 0.8098 ¹¹ 0.8093 ⁴ D ₀ ²⁰ 0.816 ⁴ D ₁₅ ¹⁵ 0.8136 ^{1,2} D _{13.5} ^{13.5} 0.8275 ¹² @ 0° 0.8253 ⁴ D _c ⁰	1.4436₆ 1.4419 ⁹ @ 24° 1.44521 ¹² 1.4440 ^{7,8} 1.44355 ¹¹ 1.4466 ^{1,2} @ 13.5° 1.44090 ¹¹ n _H ²⁰ _α 1.44906 ¹¹ n _H ²⁰ _β 1.45288 ¹¹ n _H ²⁰ _γ	$\frac{dD}{dt} = -0.000897/^\circ\text{C.}$ (0° to 60°) $\frac{dn}{dt} = -0.000444/^\circ\text{C.}$ (10° to 25°)
C₈H₁₆ Methylcycloheptane 		134 135 to 136 ¹ @ 767mm 134 ¹³ 133 to 135 ⁹	0.8052 ⁹ 0.7981 ¹³ @ 18° 0.8087 ^{1,2} D _{13.5} ^{13.5}	1.4403 1.4410 ⁹ 1.4382 ¹³ 1.4390 ¹³ @ 18° 1.4436 ² @ 13.5°	$\frac{dn}{dt} = -0.00047/^\circ\text{C.}$ (10° to 20°)

<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
Ethylcycloheptane 		163 to 163.5 ° @ 740mm	0.8152 ° D ₀ ²⁰ 0.8299 ° D ₀ ⁰		
1,2-Dimethylcycloheptane 		153 °			
C₁₀H₂₀ Propylcycloheptane 		183 to 184 ° @ 756mm	0.8175 ° @ 18°	1.4502 ° @ 18°	
1,1,2-Trimethylcycloheptane 		104 to 105 ° @ 100mm	0.8243 °	1.4527 °	

<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
1,1,4-Trimethylcycloheptane 		162 to 163 ° @ 720mm	0.8011 °	1.4420 °	

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Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclooctane 	14.2 to 14.4 ¹⁹ 14 ²⁰ 13 to 14 ²² 11.5 ¹⁸ 9.5 to 11.5 ¹	145.3 to 146.3 ¹⁶ 146.5 ¹ @ 752mm 148.5 to 149.5 ²² @ 749mm 144 ⁷ @ 730mm 147 to 148 ²⁰ @ 720mm 145.3 to 148 ¹⁸ @ 720mm 149.6 to 150.6 ¹⁹ @ 709mm 39 to 42 ¹⁷ @ 15mm	0.8304 ₇ 0.7800 ⁷ @ 78.3° 0.7800 ¹⁴ @ 78° 0.7947 ⁸ @ 61.2° 0.8296 ⁷ 0.830 ¹⁴ 0.833 ^{2,18} 0.8349 ²² 0.835 ¹⁶ 0.839 ¹⁹ 0.841 ²⁰ 0.8318 ⁸ @ 17° 0.8332 ⁷ @ 15.8° 0.8396 ^{1,3} D _{13.5} ^{13,5} 0.850 ¹⁸ @ 0° 0.855 ²⁰ @ 0°	1.4563 1.4558 ⁷ 1.45777 ¹⁶ 1.4586 ^{19,22} 1.4610 ^{1,3} @ 13.5° 1.4641 ¹⁴ n _{H₂O} ¹⁸ 1.4573 ¹⁴ n _{H₂O} ¹⁶ 1.4662 ¹⁴ n _{H₂O} ¹⁸ 1.4545 ¹⁴ n _{H₂O} ¹⁶	$\frac{dD}{dt} = -0.000869/^\circ\text{C.}$ (10° to 80°)
C₉H₁₈ Methylcyclooctane 	14 to 16 ¹	160 to 163 ¹ @ 750mm 148.5 ²² @ 749mm	0.8349 ¹ 0.8405 ¹ D _{18.5} ^{13,5}	1.4567 ³ @ 13.5°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclononane		170 to 172 ²¹	0.7733 ²¹ @ 16° 0.785 ²¹ @ 0°	1.4328 ²¹ @ 16°	
C₁₀H₂₀ Cyclodecane	9.6 ^{4,18}	201 ⁴ 82 @ 16mm ⁴	0.8577 ⁴ @ 20.4° 0.8584 ⁴ @ 19.6°	1.46922 ⁴ n _{H_a} ²⁰ 1.47758 ⁴ n _{H_β} ²⁰ 1.48242 ⁴ n _{H_γ} ²⁰ 1.47181 ⁴ n _{H_e} ^{19.8}	
C₁₁H₂₂ Cycloundecane		183.5 to 184.5 @ 764.5mm ⁵ 179 to 181 ⁶	0.81284 ⁵ 0.8002 ⁶ @ 14° 0.8119 ⁶ @ 0°	1.44834 ⁵	
C₁₂H₂₄ Cyclododecane	61 ¹⁴	118 ¹⁴ @ 18mm	0.8223 ¹⁴ @ 75° 0.8340 ¹⁴ @ 58°		$\frac{dD}{dt} = +0.00070/°C.$ (55° to 75°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclotridecane	18 ¹⁴	112 to 113 ¹⁴ @ 9mm	0.8513 ¹⁴ @ 33.5° 0.8608 ¹⁴ 0.8636 ¹⁴ @ 16°		$\frac{dD}{dt} = -0.0007/^\circ\text{C.}$ (15° to 35°)
C ₁₄ H ₂₈ Cyclotetradecane	53 ¹⁴	143 ¹⁴ @ 16mm	0.8259 ¹⁴ @ 79° 0.8284 ¹⁴ @ 75°	1.4515 ¹⁴ @ 80° 1.4533 ¹⁴ $n_{H_e}^{76}$ 1.4506 ¹⁴ $n_{H_e}^{76}$ 1.4623 ¹⁴ $n_{H_e}^{76}$	
C ₁₅ H ₃₀ Cyclopentadecane	61 ¹⁴		0.8048 ¹⁴ @ 109° 0.8240 ¹⁴ @ 78° 0.828 ¹⁴ @ 71°	1.4522 ¹⁴ @ 80° 1.4448 ¹⁴ $n_{H_e}^{101}$ 1.4554 ¹⁴ $n_{H_e}^{71}$ 1.4528 ¹⁴ $n_{H_e}^{71}$ 1.4644 ¹⁴ $n_{H_e}^{71}$	$\frac{dD}{dt} = -0.0006_4/^\circ\text{C.}$ (75° to 110°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Methylcyclopentadecane	- 19 ¹⁴	147 to 148 ¹¹ @ 12mm	0.8585 ₁ 0.8051 ¹⁴ @ 109° 0.8227 ⁸ @ 79.2° 0.8337 ⁸ @ 60.9° 0.8475 ⁸ @ 34.5° 0.8576 ¹¹ @ 21° 0.8593 ⁸ @ 20.3° 0.858 ¹⁴ 0.8594 ¹⁴ @ 19°	1.4735 ¹⁴ @ 21° 1.4438 ¹⁴ n _{H₂O} ¹⁰² 1.4716 ¹⁴ n _{H₂O} ¹⁸ 1.4837 ¹⁴ n _{H₂O} ¹⁸	$\frac{dD}{dt} = -0.0006200$ (1-0.000499t)/°C. (20° to 80°)
Cyclohexadecane	57 ¹⁴ 61 ⁹	170 to 171 ¹⁴ @ 20mm	0.819 ¹⁴ @ 79° 0.824 ¹⁴ @ 72°	1.4529 ¹⁴ @ 80° 1.4557 ¹⁴ @ 72°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cycloheptadecane	65 ¹⁴		0.8021 ¹⁴ @ 108° 0.8062 ¹⁴ @ 101° 0.8200 ¹⁴ @ 77°	1.4507 ¹⁴ @ 80° 1.4436 ¹⁴ n _{H₂O} ¹⁰¹ 1.4409 ¹⁴ n _{H₂O} ¹⁰¹ 1.4524 ¹⁴ n _{H₂O} ¹⁰¹	$\frac{dD}{dt} = -0.00058/^\circ\text{C.}$ (75° to 110°)
C ₁₅ H ₂₆ Cycloöctadecane	72 ^{9,14}		0.7998 ¹⁴ @ 111° 0.8201 ¹⁴ @ 76°	1.4506 ¹⁴ @ 80° 1.4427 ¹⁴ n _{H₂O} ¹⁰⁴ 1.4533 ¹⁴ n _{H₂O} ⁷² 1.4399 ¹⁴ n _{H₂O} ¹⁰⁴ 1.4506 ¹⁴ n _{H₂O} ⁷² 1.4514 ¹⁴ n _{H₂O} ¹⁰⁴ 1.4624 ¹⁴ n _{H₂O} ⁷²	$\frac{dD}{dt} = -0.0006/^\circ\text{C.}$ (75° to 110°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclodocosane	46 ¹⁴	212 ¹⁴ @ 16mm	0.8174 ¹⁴ @ 75°	1.4481 ¹⁴ @ 80° 1.4499 ¹⁴ n _{H₂O} ⁷⁵ 1.4472 ¹⁴ n _{H₂O} ⁷⁵ 1.4589 ¹⁴ n _{H₂O} ⁷⁵	
C₂₂H₄₄ Cyclotricosane	49 to 50 ¹³ 56 ¹⁴	177 ¹³ @ 0.4mm	0.8280 ₀ @ 60° 0.7973 ¹⁴ @ 111° 0.8233 ¹⁴ @ 69° 0.8259 ¹³ @ 64° 0.8305 ¹³ @ 55°	1.4558 ¹³ @ 56°	$\frac{dD}{dt} = -0.0002870$ (1 + 0.0128t)/°C. (55° to 110°)
C₂₄H₄₈ Cyclotetracosane	47 ¹⁴	222 to 228 ¹⁴ @ 0.6mm			




Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclohexacosane			0.8238 @ 60°		$\frac{dD}{dt} = -0.000609/^\circ\text{C.}$ (60° to 115°)
	41 to 42 ¹⁰ 42 ¹⁴	218 to 219 ¹⁴ @ 0.5mm	0.7924 ¹⁴ @ 112° 0.8120 ¹⁴ @ 78° 0.8255 ¹⁰ @ 58°	1.4484 ¹⁴ @ 80° 1.4463 ¹⁴ <i>n</i> _{H₈} ⁷⁸ 1.4491 ¹² <i>n</i> _{H₈} ⁷⁸ 1.4536 ¹² <i>n</i> _{H₈} ⁷⁸ 1.4558 ¹⁴ <i>n</i> _{H₈} ⁷⁸ 1.4580 ¹⁴ <i>n</i> _{H₈} ⁷⁸	
C₂₈H₅₆ Cycloöctacosane					
	47 to 48 ¹⁰ 48 ¹⁴	213 to 214 ¹⁴ @ 0.25mm	0.8103 ¹⁴ @ 80° 0.813 ¹⁴ @ 76° 0.8243 ¹⁰ @ 58°	1.4489 ¹⁴ @ 80°	




Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclononacosane	47 ¹⁴		0.8232 ¹⁴ @ 64° 0.8429 ¹⁴ @ 33°		$\frac{dD}{dt} = -0.00064/^\circ\text{C.}$ (35° to 65°)
C₃₃H₆₈ Cyclotriacontane	53 to 54 ⁹ 56 ¹⁴ 57.8 ¹⁰	230 ¹⁰ @ 0.2mm	0.8294 @ 60° 0.7973 ¹⁴ @ 111° 0.8180 ¹⁴ @ 77° 0.8219 ¹⁰ @ 73° 0.8233 ¹⁴ @ 69° 0.8308 ¹⁴ @ 58°	1.4401 ¹⁰ @ 114° 1.4523 ¹⁴ @ 80° 1.4555 ¹⁰ @ 71°	$\frac{dD}{dt} = -0.00063/^\circ\text{C.}$ (60° to 110°)
C₃₄H₇₀ 1,16-Dimethylcyclo- triacontane	52 ⁷		0.808 ⁷ @ 89.3° 0.813 ⁷ @ 80°	1.4498 ⁷ @ 80°	

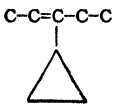
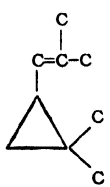
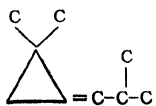
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclodotriacontane	59 to 60 ¹⁰		0.8261 ¹⁰ @ 70°	1.4568 ¹⁰ @ 70° 1.4590 ¹⁰ @ 63°	
C₄₄H₈₈ Cyclotettratriacontane	66 to 67 ¹⁰	230 to 240 ¹⁰ @ 0.3mm	0.8229 ¹⁰ @ 76°	1.4302 ¹⁰ @ 151° 1.4443 ¹⁰ @ 107° 1.4568 ¹⁰ @ 72°	$\frac{dn}{dt} = -0.000337/^\circ\text{C.}$ (75° to 150°)

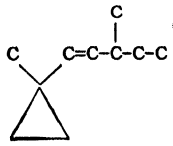
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2. CYCLANES WITH AN ALKENYL OR OLEFIN SUBSTITUTION

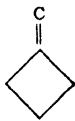
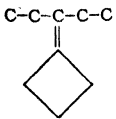
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Ethylidenecyclopropane 		37.5 ° @ 750mm	0.7052 ° @ 18° 0.7235 ° @ 0°	1.40255 ° @ 18°	$\frac{dD}{dt} = -0.001_9/^\circ\text{C.}$ (0° to 20°)
Cyclopropylethylene (Ethenylcyclopropane) 		40 to 40.2 ° @ 755mm	0.721 0.723 ° @ 18° 0.726 ° @ 15° 0.7311 ° @ 10° 0.7415 ° @ 0°	1.4172 ° @ 15° 1.4205 ° @ 10°	$\frac{dD}{dt} = -0.001_9/^\circ\text{C.}$ (0° to 20°)
C₄H₁₀ 2-Cyclopropylpropene-1 (Isopropenylcyclopropane) 		71.1 to 71.5 ¹⁰ @ 772mm 69.5 to 70.0 ⁷ @ 751mm	0.74999 ⁷ 0.7510 ¹⁰	1.4252 ¹⁰ 1.42524 ⁷ 1.42064 ⁷ n _D ²⁰ ₄ 1.43206 ⁷ n _D ²⁰ _β	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Isopropylidenecyclopropane (2-Cyclopropylidene- propane) $\text{C}-\text{C}-\text{C}$ \parallel 		70.5 to 71 ¹ @ 763mm 71 to 71.5 ¹² @ 718mm	0.7531 ¹	1.424 ¹ 1.4264 ¹² @ 17°	
C₇H₁₂ 2-Cyclopropylbutene-1 $\text{C}=\text{C}-\text{C}-\text{C}$ $ $ 		103.5 to 103.8 ⁷	0.7772 ⁷	1.43901 ⁷ 1.43569 ⁷ n _{D_a} ²⁰ 1.44926 ⁷ n _{D_β} ²⁰ 1.45515 ⁷ n _{D_γ} ²⁰	
2-Cyclopropylbutene-2 (1-Methylpropen-1-yl- cyclopropane) $\text{C}-\text{C}=\text{C}-\text{C}$ $ $ 		105.5 to 106 ⁷	0.7804 ⁷	1.44253 ⁷ 1.43861 ⁷ n _{D_a} ²⁰ 1.44926 ⁷ n _{D_β} ²⁰ 1.45515 ⁷ n _{D_γ} ²⁰	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Cyclopropylpentene-2 		127.5 to 128 ° @ 762.5mm 129 to 130 °	0.79150 ° 0.7644 °	1.447 1.44454 ° 1.45841 ° 1.44159 ° n _H ²⁰ 1.45156 ° n _H ²⁰	
C₈H₁₆ 2,2-Dimethyl-1-(2-methylpropen-1-yl)-cyclopropane 		132 ° @ 758mm	0.7677 ° 0.7681 ° D ₀ ²⁰	1.4420 °	
1,1-Dimethyl-2-(2-methylpropylidene)-cyclopropane 	- 18 °	112 °			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-1-(3-methylpenten-1-yl)-cyclopropane 		162 to 162.7 ° 160 to 160.5 ° @ 735mm			

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Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Methylenecyclobutane 		42 ³ 42 ⁴ @ 749mm 40.6 to 41.6 ^{1,2} @ 732mm	0.738₈ 0.7360 ³ @ 23° 0.7425 ^{1,2} @ 15° 0.7487 ¹ @ 10° 0.7583 ² @ 0° 0.7585 ¹ @ 0°	1.42353 ^{1,2} @ 15° 1.42626 ^{1,2} @ 10°	$\frac{dD}{dt} = -0.00099/^\circ\text{C.}$ (0° to 25°)
C₈H₁₆ 3-Cyclobutylidene- pentane 			0.8091 ³	1.4510 ³	

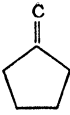
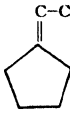
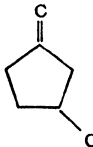
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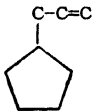
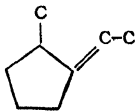
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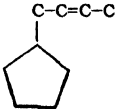
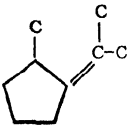
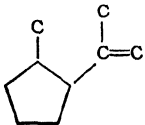
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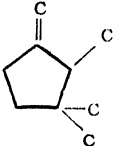
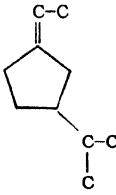
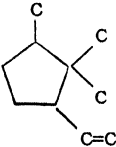
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Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Methylenecyclopentane 		77 to 79 ° @ 767mm 78 to 81 ° 75 to 76 ° _{8a} 76 to 78 °	0.778₇ 0.7518 ° _{8a} @ 44.8° 0.7541 ° _{8a} @ 42.7° 0.7778 ° _{8a} @ 20.8° 0.7770 ° 0.7787 °, ° _{8a} 0.778 °	1.4350 ° 1.43078 ° _{8a} 1.4320 ° 1.4351 ° 1.4355 ° @ 19° 1.42808 ° _{8a} n _{H_a} ²⁰ 1.43743 ° _{8a} n _{H_β} ²⁰ 1.44257 ° _{8a} n _{H_γ} ²⁰	$\frac{dD}{dt} = -0.0010_8/^\circ\text{C.}$ (20° to 45°)
C₇H₁₂ Ethylidenecyclopentane 		113 to 117 ° ¹²	0.8020 ° ¹²	1.4481 ° ¹²	
1-Methylene-3-methylcyclopentane 		96 to 97 ° ^{7, 13} 93.5 ° ¹⁴	0.7734 ° ¹⁴ @ 19° 0.7750 ° ^{7, 13} @ 16°	1.4296 ° ¹⁴ @ 19° 1.4336 ° ¹³ @ 16°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Isopropylidenecyclopentane 		136 to 137 °	0.817 °	1.4581 °	
1-Cyclopentylpropene-2 (Allylcyclopentane) 		124 to 126 °	0.793 ° @ 23°	1.440 ° @ 23°	
1-Methyl-2-ethylidene-cyclopentane 		123 to 124 °	0.7995 °	1.44421 °	

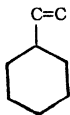
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
1-Cyclopentylbutene-2 (Buten-2-ylcyclopentane) 		156 to 158 °	0.806 ° @ 24.5°	1.4482 ° @ 25°	
1-Methyl-2-isopropylidenecyclopentane 		149 to 151 ° @ 755mm	0.8104 ° D_0^{20}	1.4518 °	
1-Methyl-2-isopropenylcyclopentane 		141 to 143 ° @ 757mm	0.8005 °	1.4455 °	

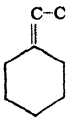
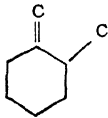
<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
1-Methylene-2,3,3-trimethylcyclopentane 		138 to 140 ¹			
C₁₀H₁₈ 1-Ethylidene-3-isopropylcyclopentane 		172 to 174 ¹⁰	0.809 ¹⁰	1.4506 ¹⁰	
1,2,2-Trimethyl-3-ethenylcyclopentane 		155 to 156 ²	0.8024 ² @ 24°	1.4439 ² @ 25°	

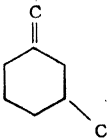

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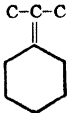
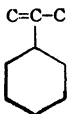
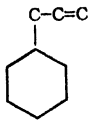
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Methylenecyclohexane		103.5	0.803₃	1.450₂	$\frac{dD}{dt} = -0.0008/^\circ\text{C.}$ (0° to 60°)
		105 to 106 ³⁴ @ 770mm	0.7704 ³⁵ @ 61.0°	1.4528 ³¹ 1.45227 ³⁵	
		102 to 103 ³⁵ @ 764mm	0.7867 ³⁵ @ 41.5°	1.4502 ⁴	
		105 to 106 ^{s, 36, 37} @ 40.9°	0.7872 ³⁵ @ 40.9°	1.4501 ^{s, 36, 37}	
		103 to 106 ^{11, 37}	0.7992 ⁴	1.4490 ²	
		103 to 104 ³¹	0.801 ⁵	1.4491 to 1.4516 ³⁷	
		102 to 103 ¹³	0.8018 ³⁴	1.4486 ³⁴	
		101 to 102 ²	0.802 to 0.804 ³⁷	1.45092 ⁶ @ 17.8°	
		102.5 ⁶ @ 756mm	0.8025 ^{36, 37}	1.45182 ⁵	
		100.5 to 101.3 ⁶ @ 756mm	0.8032 ³¹ 0.8034 ²	@ 16.4° 1.45222 ⁶ @ 15.5°	
		101.2 to 102 ⁶ @ 751mm	0.8074 ³⁵ 0.8034 ⁶ @ 17.8°	1.45341 ⁶ @ 13.2°	
		104 ^{4, 5} @ 749mm	0.8036 ⁶ @ 17.6°	1.44916 ³⁵ n _H ²⁰ _a	
			0.8097 ³⁵ @ 17.5°	1.44803 ⁶ n _H ^{17.8} _a	
			0.8021 ⁵ @ 16.4°	1.44863 ⁵ n _H ^{16.4} _a	
			0.8055 ⁶ @ 15.6°	1.44934 ⁶ n _H ^{15.6} _a	
			0.8056 ⁶ @ 15.5°	1.45053 ⁶ n _H ^{15.2} _a	
			0.8040 ⁵ @ 14°	1.45973 ³⁵ n _H ²⁰ _β	
			0.8184 ¹³ D ₆ ⁰	1.45820 ⁶ n _H ^{17.8} _β	
				1.45879 ⁵ n _H ^{16.4} _β	
				1.45958 ⁶ n _H ^{15.6} _β	
				1.46086 ⁶ n _H ^{13.2} _β	

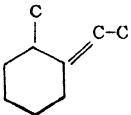
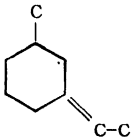
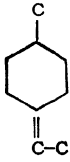
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Methylenecyclohexane (Continued)				1.46567 ³⁵ n _{H_γ} ²⁰ 1.46430 ⁶ n _{H_γ} ^{17.8} 1.46488 ⁵ n _{H_γ} ^{16.4} 1.46568 ⁶ n _{H_γ} ^{16.6} 1.46696 ⁶ n _{H_γ} ^{13.2}	
C₈H₁₄ Cyclohexylethylene (Vinylcyclohexane)		131 to 132 ²² @ 750mm 130 to 131 ²⁴ @ 749mm	0.8134 ²² 0.8166 ²⁴ @ 19°	1.4546 ²² 1.4550 ²⁴ @ 19°	

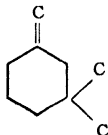
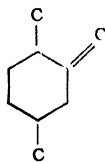
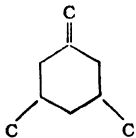


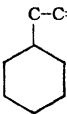
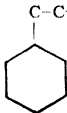
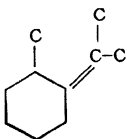
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Ethylidenecyclohexane 		137 136 to 136.4 ⁶ @ 766mm 137 to 138 ⁴⁴ 135 to 136 ¹³ 134 to 136 ⁴⁶	0.8220 ⁵ @ 20.3° 0.8220 ⁴⁴ 0.8225 ¹⁴ 0.8235 ⁴⁶ @ 19° 0.8286 ¹⁴ @ 19° 0.8230 ⁴⁴ @ 18° 0.8237 ⁶ @ 17.6° 0.8239 ⁶ @ 17.3°	1.46299 ⁵ 1.4626 ⁴⁴ 1.4591 ⁴⁶ @ 19° 1.4577 ¹⁴ @ 19° 1.4631 ⁴⁴ @ 18° 1.46389 ⁶ @ 17.6° 1.46094 ⁶ n _{H_a} ^{17.6} 1.4596 ⁵ n _{H_a} ^{17.3} 1.47139 ⁶ n _{H_β} ^{17.6} 1.47010 ⁵ n _{H_β} ^{17.3} 1.47773 ⁶ n _{H_γ} ^{17.6} 1.47633 ⁵ n _{H_γ} ^{17.3}	
1-Methylene-2-methyl- cyclohexane 		122 to 125 ⁴¹	0.808 ⁴¹ @ 22°	1.4516 ⁴¹ @ 22°	

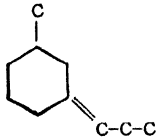
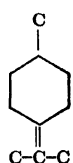
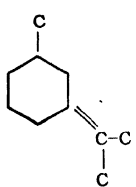
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methylene-3-methyl-cyclohexane 		123 to 124 ³⁵ @ 762mm 123 to 124 ³⁶	0.795₈ 0.7610 ³⁵ @ 61.9° 0.7614 ³⁶ @ 61.5° 0.7778 ³⁵ @ 42.1° 0.794 ³⁶ 0.7970 ³⁵ 0.797 ³⁶ @ 18° 0.8003 ³⁵ @ 16.3°	1.44626 ³⁵ 1.4461 ³⁶ 1.4466 ³⁶ 1.44337 ³⁵ n _{H_a} ²⁰ 1.45336 ³⁵ n _{H_β} ²⁰ 1.45887 ³⁵ n _H ²⁰	$[\alpha]_D^{15} = -30.22^\circ$ ³⁶ $\frac{dD}{dt} = -0.00079/^\circ\text{C.}$ (15° to 65°)
1-Methylene-4-methyl-cyclohexane 	63 to 64 ³⁸	124 to 125 ^{35, 36} @ 772mm 122 to 123 ⁴³ 122 ^{29, 38} 120 to 121 ²	0.798₁ 0.7407 ³⁵ @ 87.3° 0.7412 ^{35, 36} @ 86.7° 0.7634 ^{35, 36} @ 60.9° 0.7925 ⁴³ @ 22° 0.7920 ³⁷ D ₂₀ ²⁰ 0.7945 ² 0.7996 ^{35, 39} 0.7923 ²⁹ D ₁₉ ¹⁹ 0.8033 ^{35, 39} @ 15.9°	1.4446 ^{38, 43} @ 22° 1.4483 ² 1.44626 ^{35, 36} 1.4450 ³⁷ 1.4465 ²⁹ @ 18° 1.44339 ³⁵ n _{H_a} ²⁰ 1.45338 ³⁵ n _{H_β} ²⁰ 1.45890 ³⁵ n _{H_γ} ²⁰	$\frac{dD}{dt} = -0.00086/^\circ\text{C.}$ (15° to 90°) $\frac{dn}{dt} = -0.00048/^\circ\text{C.}$ (15° to 25°)

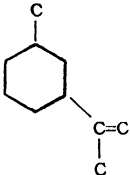
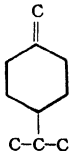
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Isopropylidenecyclohexane (2-Cyclohexylidenepropane) 		160 to 161 ⁴⁵ 152 to 153 ¹⁶ @ 740mm	0.836 ⁴⁵	1.4723 ⁴⁵	
Isopropenylcyclohexane (2-Cyclohexylpropene-1) 		157 to 158 ²⁵			
1-Cyclohexylpropene-2 (Allylcyclohexane) 		154 to 154.4 ²⁶ 152 ⁸ 149 to 151 ²³ 148 to 140 ¹⁷ 148 to 149 ³⁰	0.816, 0.8010 ¹⁷ @ 41.5° 0.8117 ¹⁷ @ 28.5° 0.808 ⁸ @ 21° 0.8160 ¹⁷ @ 15° 0.8156 ²³ 0.8196 ³⁰ @ 13° 0.813 ⁸ @ 13° 0.8312 ³⁰ @ 0°	1.450, 1.4483 ¹⁷ @ 25° 1.449 ⁸ @ 21° 1.454 ²³ 1.4528 ¹⁷ @ 15° 1.45362 ³⁰ @ 13° 1.452 ⁸ @ 13°	$\frac{dD}{dt} = -0.0007_3/^\circ\text{C.}$ (0° to 45°) $\frac{dn}{dt} = -0.0004_8/^\circ\text{C.}$ (10° to 25°)

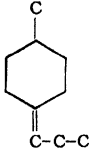

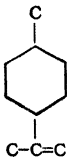
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Methyl-2-ethylidene-cyclohexane 		158 ²⁷	0.81 ²⁷ @ 81° 0.823 ²⁷ @ 0°	1.47 ²⁷	
1-Methyl-3-ethylidene-cyclohexane 		153 ^{44a} 152 ¹⁵	0.813 ^{44a} 0.8135 ¹⁵ D_{19}^{19}	1.4584 ^{44a} 1.4590 ¹⁵ @ 19°	$[\alpha]_D = -50^\circ$ ¹⁵
1-Methyl-4-ethylidene-cyclohexane 		152 to 153 ⁴⁹	0.810 ⁴⁹ @ 21° 0.812 ⁴⁹ @ 19°	1.4571 ⁴⁹ @ 21° 1.4574 ⁴⁹ @ 19°	

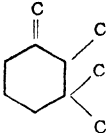
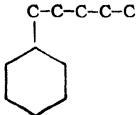
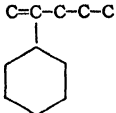
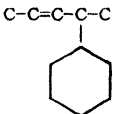
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methylene-3,3-dimethylcyclohexane 		138 to 141 ¹² @ 739mm	0.7970 ¹² @ 16.5° 0.8013 ¹² @ 10°	1.44837 ¹² @ 10°	
2-Methylene-1,4-dimethylcyclohexane 		135 to 136 ⁶ @ 764mm	0.7922 ⁶ @ 14.1°	1.446 ⁶ @ 14.6°	
1-Methylene-3,5-dimethylcyclohexane 		135 to 136 ^{4,6} @ 744mm	0.7918 ^{4,6} @ 14.6° 0.7922 ^{4,6} @ 14.1°	1.44628 ⁶ @ 14.6° 1.44334 ⁶ n _{D_a} ^{14,6} 1.45313 ⁶ n _{D_β} ^{14,6} 1.45917 ⁶ n _{D_γ} ^{14,6}	

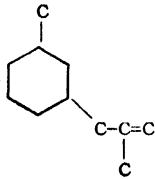
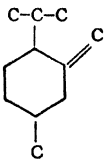
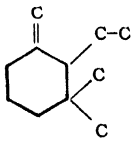
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Cyclohexylbutene-2 (Buten-2-ylcyclohexane) 		177 ° 66 @ 14mm ⁷	0.813 ° @ 21° 0.818 ° @ 13°	1.453 ° @ 21° 1.457 ° @ 13°	
1-Cyclohexylbutene-3 (Buten-3-ylcyclohexane) 		174.5 to 175 ° ²² 174 ° 62 @ 14mm ⁸	0.810 ° @ 21° 0.8131 ° ²²	1.450 ° @ 21° 1.453 ° ²²	
1-Cyclohexylbutene-x			0.815 °	1.454 ° @ 13°	
1-Methyl-2-isopropylidenecyclohexane 		160 to 162 ° ⁴²	0.8345 ° ⁴²	1.4670 ° ⁴²	

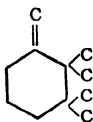
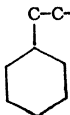

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Methyl-3-propyldenecyclohexane 		170 to 173 ⁴⁸	0.814 ⁴⁸ @ 19°	1.4591 ⁴⁸ @ 19°	$[\alpha]_D = -34^\circ 28' ^{48}$
1-Methyl-4-isopropyldenecyclohexane 		172 to 174 ³⁹	0.831 ³⁹ @ 21°	1.4647 ³⁹ @ 21°	
1-1-Methyl-3-isopropylidenecyclohexane 		173 to 175 ⁴² 172.5 to 174.5 ²¹ @ 749mm	0.8250 ⁴² 0.8214 ²¹	1.4569 ²¹ 1.4577 ²¹ 1.4582 ²¹ 1.4670 ⁴²	$[\alpha]_D = -0.51^\circ ^{20}$

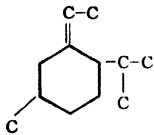
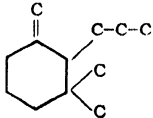
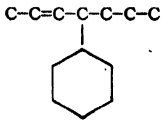
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
d-1-Methyl-3-isopropenylcyclohexane 		170 to 170.5 ²¹ @ 751mm	0.8178 ²¹ D_0^{20}	1.4546 ²¹	$[\alpha]_D = +9.73^\circ$ ²¹
l-1-Methyl-3-isopropenylcyclohexane		170 to 171 ²⁰ @ 749mm	0.8185 ²⁰ D_0^{20}	1.4574 ²⁰	$[\alpha]_D = -8.06^\circ$ ²⁰
1-Methylene-4-isopropylcyclohexane 			0.8667 ¹⁸	1.4840 ¹⁸	


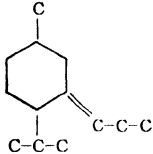
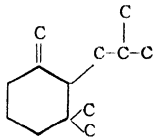
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-propyldenecyclohexane 		175 to 177 ⁴⁸ 173 to 174 ⁴⁰	0.8110 ⁴⁰ 0.8135 ⁴⁸ @ 19°	1.4571 ⁴⁰ 1.4516 ⁴⁸ @ 19°	
1-Methyl-4-isopropyldenecyclohexane (p-Menthene-4) 		172 to 174 ^{8,36,40} 170 to 172 ⁷ 169 to 170 ³² @ 748mm	0.8189 ³² D ₂₁ ²² 0.8345 ⁴² 0.831 ³⁶ @ 21° 0.819 ⁷ @ 21° 0.8175 ⁷ @ 20.5°	1.4647 ³⁶ 1.4670 ⁴⁰ 1.45922 ⁷ 1.45862 ⁷ 1.45823 ³²	
1-Methyl-4-isopropenylcyclohexane (Dihydrolimonene) 		170 ¹⁹ @ 750mm 168 to 169 ³² @ 750mm 170 to 170.5 ²⁸ @ 746mm 53 to 54 ³³ @ 14mm	0.8217 ³² @ 21° 0.8142 ¹⁹ D ₀ ²⁰ 0.8104 ³³ 0.810 ²³ D ₁₅ ¹⁵	1.45673 ³² @ 21° 1.45662 ³³ 1.4523 ¹⁹	

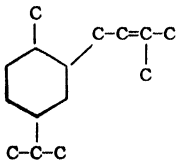
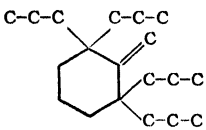
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methylene-2,3,3-trimethylcyclohexane (Methyl-γ-geraniolene) 		164 ¹² @ 738mm	0.8320 ¹² @ 11°	1.46274 ¹² @ 15° 1.46414 ¹² @ 11°	
C₁₁H₂₀ 1-Cyclohexylpentene-x 		196 ⁸ 83 @ 14mm ⁸	0.816 ⁸	1.454 ⁸	
2-Cyclohexylpentene-1 		198 to 199 ⁸ 85 @ 16mm ⁸	0.822 ⁸	1.458 ⁸	
4-Cyclohexylpentene-2 		125.3 to 126.3 @ 95mm ²⁶	0.8322 ²⁶ @ 25°	1.4595 ²⁶ @ 25°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-3-(2-methylpropen-2-yl)-cyclohexane 		186.5 to 187.5 ⁴⁷	0.8120 ⁴⁷	1.4546 ⁴⁷	
2-Methylene-4-methyl-1-isopropylcyclohexane 		181 to 182 ¹	0.8273 ¹ @ 16°		[α] _D = +87.25° ¹
1-Methylene-3,3-dimethyl-2-ethylcyclohexane (Ethyl-γ-geraniolene) 		182 to 184 ¹² @ 745mm	0.8160 ¹² @ 10°	1.46235 ¹² @ 10°	

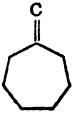
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Methylene-2,2,3,3-tetramethylcyclohexane (Dimethyl- γ -cyclogeraniolene) 		181 to 183 ¹² @ 756mm	0.8246 ¹² @ 11°	1.46275 ¹² @ 12°	
$C_{12}H_{22}$ 1-Cyclohexylhexene-x 		219 ⁸ 99 @ 16mm ⁸	0.820 ⁸ @ 21°	1.457 ⁸ @ 21°	
2-Cyclohexylhexene-x 		221 ⁸ 102 ⁸ @ 17mm	0.823 ⁸ @ 21°	1.459 ⁸ @ 21°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
5-Methyl-1-ethylidene-2-isopropylcyclohexane 		58 to 59 ¹ @ 4mm	0.8304 ¹ @ 16°		[α] _D ¹⁴ = +34.79° ¹
1-Methylene-3,3-dimethyl-2-propylcyclohexane (Propyl-γ-cyclogeraniolene)		200 to 202 ¹² @ 741mm 83 to 85 ¹² @ 12mm	0.8126 ¹² @ 10°	1.46176 ¹² @ 10.5°	
					
C₁₁H₂₂ 4-Cyclohexylheptene-2 		135.6 to 136.6 ²⁴ @ 45mm	0.8355 ²⁴ @ 25°	1.4630 ²⁴ @ 25°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
4-Cyclohexylheptene-x $\text{C}-\text{C}-\text{C}-\text{C}-\text{C}-\text{C}$ 		226 to 228 ³ @ 755mm	0.8441 ³ @ 21°	1.467 ³ @ 21°	
1-Methyl-3-propyldene-4-isopropylcyclohexane 			0.8129 ¹ @ 16.5°		
1-Methylene-3,3-dimethyl-2-(2-methylpropyl)-cyclohexane (Isobutyl-γ-cyclo-geraniolene) 		212 to 213 ¹² @ 742mm	0.8112 ¹² @ 11°	1.46086 ¹² @ 11°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-isopropyl- 2-(3-methylbuten-2- yl)-cyclohexane 		127 to 128 ° @ 19mm	0.8418 ° D ₂₅ ²⁵	1.4702 ° @ 25°	
C₁₁H₂₀ 2-Methylene-1,1,3,3- tetrapropylcyclohexane 		165 ¹⁰ @ 15mm	0.8618 ¹⁰ @ 16°	1.4800 ¹⁰ @ 16°	

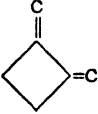
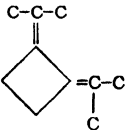
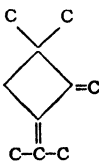
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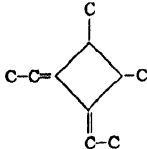
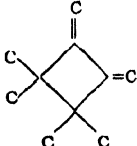
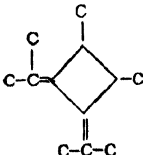
<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
Methylenecyclo- heptane 		138 to 140 ¹	0.824 ^{1,2}	1.4611 ¹	

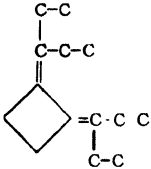
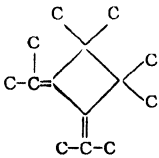

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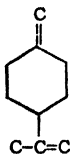
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3. CYCLANES WITH TWO ALKENYL OR TWO OLEFIN
SUBSTITUTIONS, C_nH_{2n-4} C_nH_{2n-4}

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,2-Dimethylenecyclobutane 		63 to 65 ⁴	0.7698 ⁴	1.42317 ⁴	
$C_{10}H_{16}$ 1,2-Diisopropylidenecyclobutane 		179 to 181 ² 61 to 62 ² @ 9mm	0.8422 ² 0.8571 ² @ 0°	1.50086 ² @ 19.7° 1.50622 ² $n_{H_a}^{19.7}$ 1.51251 ² $n_{H_\beta}^{19.7}$ 1.52345 ² $n_{H_\gamma}^{19.7}$	$\frac{dD}{dt} = -0.0074/^\circ\text{C.}$ (0° to 20°)
2-Methylene-1,1-dimethyl-3-isopropylidenecyclobutane 		149 to 150 ² @ 752mm 37 to 39 ² @ 9mm	0.7982 ² 0.8143 ² @ 0°	1.46769 ² @ 19.7° 1.46319 ² $n_{H_a}^{19.7}$ 1.47729 ² $n_{H_\beta}^{19.7}$	$\frac{dD}{dt} = -0.0008/^\circ\text{C.}$ (0° to 20°)

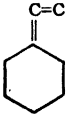
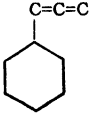
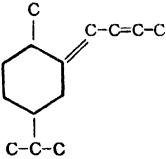
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2-Dimethyl-3,4-diethylidenecyclobutane 		163 ° @ 762mm 65 @ 22mm °	0.8113 °	1.47850 ° 1.47423 ° n _{H_a} ²⁰ 1.48913 ° n _{H_β} ²⁰ 1.49838 ° n _{H_γ} ²⁰	
1,2-Dimethylene-3,3,4,4-tetramethylcyclobutane 		140 to 141 ° 66 to 67 ° @ 55mm	0.7927 °	1.4606 ° 1.4570 ° n _{H_a} ²⁰ 1.4699 ° n _{H_β} ²⁰ 1.4781 ° n _H ²⁰	
C₁₃H₂₀ 1,2-Dimethyl-3,4-diisopropylidenecyclobutane 		190 to 191 ° @ 754mm 69 to 70 ° @ 11mm	0.8247 °	1.48337 ° 1.47946 ° n _{H_a} ²⁰ 1.49282 ° n _{H_β} ²⁰ 1.50297 ° n _H ²⁰	

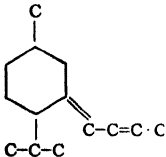
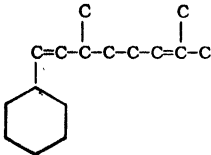
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2-Di-(1-ethylpropylidene)-cyclobutane 		102 to 104 ° @ 10mm	0.8569 ° @ 16.5°	1.48643 @ 16.5°	
1,1,2,2-Tetramethyl-3,4-diisopropylidene-cyclobutane 		86 to 88 ° @ 9mm	0.8457 ° @ 15.6° 0.8563 ° @ 0°	1.49535 ° @ 15.6°	$\frac{dD}{dt} = -0.00064/^{\circ}\text{C.}$ (0° to 20°)
C₁₀H₁₆ d-1-Methylene-4-isopropylidenecyclohexane 		69 to 73 ° @ 20mm	0.8515 ° D ₁₆ ¹⁶	1.4785 ° @ 18°	[α] _D = +2.5°

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methylene-4-isopropenylcyclohexane 		65 to 66 ¹ @ 11mm	0.8735 ¹ D ₂₀ ²⁰	1.4870 ¹	

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- (2) S. Lebedev, J. Russ. Phys. Chem. Soc. **43**, 820, 1911.
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- (8) B. Mereshkowsky, J. Russ. Phys. Chem. Soc. **45**, 1940, 1913.
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4. CYCLANES WITH AN ALKADIENYL OR DIOLEFIN
 SUBSTITUTION C_nH_{2n-4}
 C_8H_{12}

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Ethenylenecyclohexane 		138 to 141 ¹	0.8508 ¹ D_0^{20} 0.8682 ¹ D_0^0	1.4826 ¹	$\frac{dD}{dt} = -0.00087/^\circ\text{C.}$ (0° to 20°)
C₈H₁₄ Propadienylenecyclohexane 		155 to 156 ² @ 755mm	0.8239 ²	1.4658 ²	
C₁₄H₂₄ 1-Methyl-4-isopropyl-2-buten-2-ylidene-cyclohexane 		108 to 109 ³ @ 12mm			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-isopropyl-3-buten-2-ylidene-cyclohexane 		99 @ 12mm ⁴			
C₁₆H₂₈ 1-3,7-Dimethyl-1-cyclohexyloctadiene-1,6 		142 to 143 ³ @ 9mm	0.8468 ³		[α] _D ²⁰ = -6.4° ³

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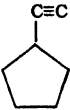
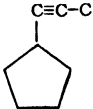
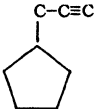
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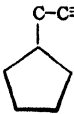
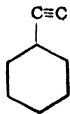
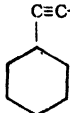
(3) H. Rupe, Ann. **402**, 176, 1913.

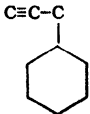
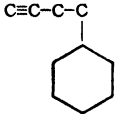
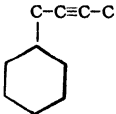
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
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5. CYCLANES WITH AN ALKYNYL OR ACETYLENE
 SUBSTITUTION, C_nH_{2n-4}
 C_7H_{10}

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Ethynylcyclopentane 		107 to 109 ⁴	0.825 ⁴ @ 22°	1.4505 ⁴ @ 18°	
C_8H_{12} 1-Cyclopentylpropyne-1 (Propyn-1-ylcyclopentane)		142 to 143 ⁴	0.843 ⁴ @ 22°	1.4636 ⁴ @ 22°	
					
3-Cyclopentylpropyne-1 (Propyn-2-ylcyclopentane)		132.5 to 133.5 ⁵	0.828 ⁵ @ 24°	1.4494 ⁵ @ 24°	
					

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Cyclopentylbutyne-2 (Butyn-2-ylcyclopentane) 		164 to 165 °	0.842 ° @ 26°	1.4621 ° @ 26°	
C₈H₁₂ Ethynylcyclohexane 		130 to 132 °, s	0.832 ° @ 23° 0.8424 ° D_4^{20} 0.8602 ° D_6^0	1.4558 ° @ 23° 1.4597 °	$\frac{dD}{dt} = -0.00089/°C.$ (0° to 20°)
C₈H₁₄ 1-Cyclohexylpropyne-1 (Propyn-1-ylcyclohexane) 		162 to 164 °	0.851 ° @ 22°	1.4682 ° @ 22°	

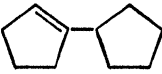
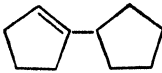
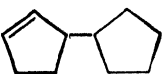
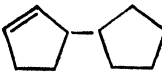
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
3-Cyclohexylpropyne-1 		157.5 to 160 ° @ 762mm 157 to 160 ° 157 to 158 ° 157 ° 55 @ 17mm ° 48 @ 12mm ° 48 @ 11mm °	0.836 ° 0.8449 ° 0.844 ° @ 18°	1.459 ° 1.4605 ° 1.4603 ° @ 18°	
$C_{10}H_{16}$ 4-Cyclohexylbutyne-1 		70 @ 17mm ° 61 to 62 ° @ 7mm	0.8462 °	1.4614 °	
1-Cyclohexylbutyne-2 		79 @ 17mm °			

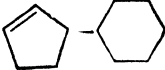
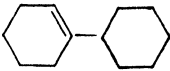
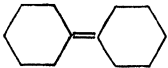
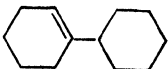
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
4-Cyclohexylpentyne-2 $\text{C}-\text{C}\equiv\text{C}-\text{C}-\text{C}$ 		93 @ 17mm ²			
5-Cyclohexylpentyne-1 $\text{C}\equiv\text{C}-\text{C}-\text{C}-\text{C}$ 		84 @ 16mm ²			
C₁₂H₂₀ 6-Cyclohexylhexyne-1 $\text{C}\equiv\text{C}-(\text{C})_3-\text{C}$ 		101 @ 16mm ²			

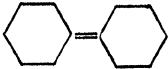
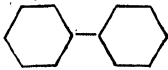
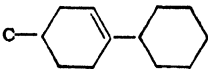
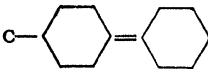
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
6-Cyclohexyl- hexyne-2 $\text{C}-\text{C}\equiv\text{C}-\text{C}-\text{C}-\text{C}$ 		109 to 110 ° @ 17mm			

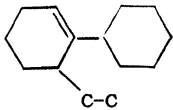
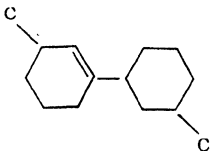
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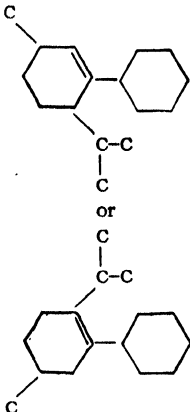
6. CYCLANES WITH A CYCLOALKENYL OR CYCLOOLEFIN
 $C_{10}H_{16}$ SUBSTITUTION, C_nH_{2n-4}

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Cyclopentylcyclopentene-1 		189 to 191 ¹⁸ @ 744mm 190 ⁵ @ 730mm	0.8898 ¹⁸	1.499 ⁵ $n_{H_2}^{20}$ 1.50047 ⁵ $n_{H_2}^{16.5}$	
1-Cyclopentylcyclopentene-1 or -2  or 		196.5 to 198 ¹⁷ 190 ⁵ 83 to 85 ³ @ 20mm 82 to 83 ⁴ @ 17mm 79 @ 13mm ⁴	0.8593 ⁴ @ 22.5° 0.9080 ¹⁷ @ 19.5° 0.9183 ³ @ 18°	1.4863 ⁴ @ 22.5° 1.4938 ¹⁷ @ 19.5° 1.4953 ³ @ 18° 1.48284 ⁴ $n_{H_2}^{22.5}$ 1.49979 ⁴ $n_{H_2}^{22.5}$ ₇	
1-Cyclopentylcyclopentene-2 		63 @ 9mm ¹	0.8838 ¹		

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
1-Cyclohexylcyclopentene-2 (Cyclopenten-2-ylcyclohexane) 		80 to 85 ¹ @ 12mm	0.8995 ¹ @ 18°	1.48698 ¹	
C ₁₂ H ₂₀ 1-Cyclohexylcyclohexene-1 (Cyclohexen-1-ylcyclohexane) 	- 41 ⁵	238.5 ¹⁸ 237 ¹⁶ 110 ⁵ @ 13mm 100 ¹⁸ @ 8.5mm 85 to 88 ¹⁸ @ 4mm	0.9010 ¹⁶ 0.9086 ¹⁸ 0.906 ¹³ D_{20}^{20} 0.9071 ⁸ @ 19.4°	1.4910 ¹⁸ 1.4916 ¹⁸ 1.4969 ¹³ 1.49556 ⁶ $n_{H_0}^{17.6}$	
Cyclohexylidenecyclohexane or 1-Cyclohexylcyclohexene-1  or 		241 ¹¹ 124 ⁹ @ 20mm	0.923 ⁹ @ 0°		

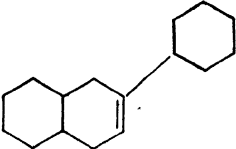
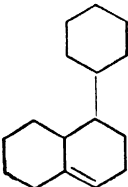
Name and Carbon Skeleton	M. P., °C.	B. P., °C @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclohexylidene- cyclohexane 		240 ¹² 236 to 237 ¹⁸ @ 742mm	1.0109 ¹⁸ @ 15°	1.4955 ¹⁸ @ 15°	
Cyclohexylcyclo- hexene-x 	- 45 ¹⁴	238 to 239 ¹⁴ 103 to 105 ¹⁴ @ 12mm	0.904 ¹⁴	1.493 ¹⁴	
C₁₂H₂₂ 4-Methyl-1-cyclo- hexylcyclohexene-1 or 4-Methyl-1-cyclo- hexylidenecyclohexane  or 		158 ⁸ @ 35mm	0.901 ⁸ @ 10°	1.489 ⁸ @ 10°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
6-Ethyl-1-cyclohexyl- cyclohexene-1 		141 to 143 ° @ 20mm	0.9274 ° 0.9406 ° @ 0°	1.5108 °	$\frac{dD}{dt} = -0.0006/^\circ\text{C.}$ (0° to 20°)
d-3-Methyl-1-(5-meth- ylcyclohexyl)-cyclo- hexene-1 		257 to 259 °	0.9119 ° D ₀ ²⁰ 0.9128 ° D ₀ ⁰		[α] _D = +0.28 °

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Methyl-6-isopropyl- 1-cyclohexylcyclo- hexene-1 or 5-Methyl-2-isopropyl- 1-cyclohexylcyclo- hexene-1					$[\alpha]_D = +6.2^\circ$
		265 ° 260 ° @ 756mm	0.9198 ° @ 14° 0.9897 ° @ 0°	1.498 °	

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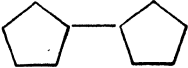
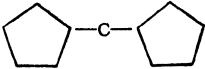
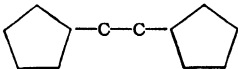
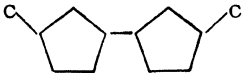
7. CYCLANES WITH A BICYCLENYL OR BICYCLOÖLEFIN
 SUBSTITUTION, C_nH_{2n-6}
 $C_{16}H_{26}$

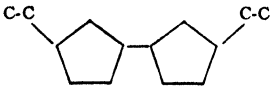
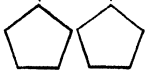
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
3-Cyclohexyl-[0,4,4]- bicyclodecene-3 (2-Cyclohexyl- Δ^2 -octahydro- naphthalene) 		163 to 164 ¹ @ 13mm	0.9422 ¹	1.51029 ¹	
2-Cyclohexyl-[0,4,4]- bicyclodecene-(5-6) 		162 to 163 ¹ @ 12mm	0.9546 ¹	1.51754 ¹	

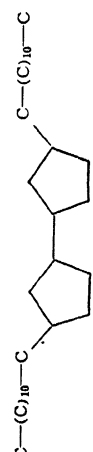
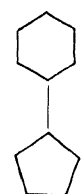
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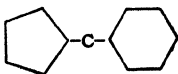
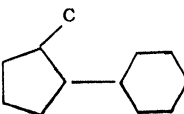
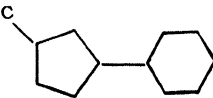
III. DICYCLANES OR DICYCLOPARAFFINS

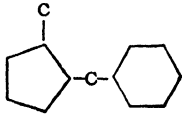
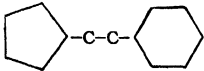
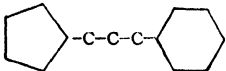
1. Dicyclanes With Alkyl Substitutions, C_nH_{2n-2}

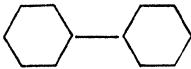
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclopentylcyclopentane (Dicyclopentyl) 		189 to 191 ^{12,37} 188 to 189 ⁶⁷ @ 753mm 189 to 190 ⁶³ @ 750mm	0.8616 0.8389 ¹² @ 50° 0.8648 ⁶³ 0.8612 ¹² 0.8604 ⁶⁷	1.4640 1.4652 ⁶⁷ 1.4640 ⁶³ 1.4638 ¹² 1.4660 ¹² @ 15°	$\frac{dD}{dt} = -0.000756/^\circ\text{C.}$ (20° to 50°)
$C_{11}H_{20}$ Dicyclopentylmethane 		208 to 210 ⁴²	0.8710 ⁴²	1.46974 ⁴²	
$C_{12}H_{22}$ 1,2-Dicyclopentylethane 		206 to 207 ⁶² @ 748mm 109 to 110 ⁴⁴ @ 17mm	0.8583 ⁶² @ 22° 0.8633 ⁴⁴	1.4651 ⁶² @ 22° 1.4657 ⁴⁴	
3-Methyl-1-(3-methylcyclopentyl)-cyclopentane (3,3' Dimethyldicyclopentyl) 	46 to 47 ²³	218 to 219 ⁶⁶ 213 to 215 ⁶⁴ 213 to 214 ⁵⁵ @ 738mm	0.8784 ⁵⁵ 0.8751 ⁶⁶ @ 18.5°	1.4755 ⁵⁵ 1.4755 ⁶⁶ @ 18.5°	

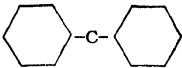
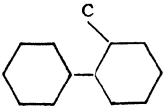
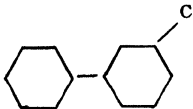
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Ethyl-1-(3-ethylcyclopentyl)-cyclopentane (3,3' Diethyldicyclopentyl) 		125 ⁶ @ 15mm	0.8757 ⁶ @ 15°	1.47097 ⁶	
C₂₄H₄₆ 4,9-Dimethyl-5,8-dicyclopentyldodecane (C) ₃ -C-C-C-C-C-C-(C) ₃ 		172 ⁷ @ 0.2mm	0.8690 ⁷		

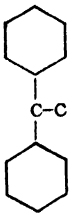
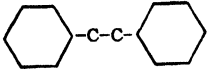
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>3-Dodecyl-1-(3-dodecylcyclopentyl)-cyclopentane</p> <p>(3,3' Didodecylidicyclopentyl)</p> 		260 ^s @ 0.2mm			
<p>C₁₁H₂₀</p> <p>Cyclopentylcyclohexane</p> 		225 to 227 ^{a1} 215.5 ¹² 214 ⁴³ 86 to 88 ^s @ 11mm	0.8535 ¹² @ 50° 0.8886 ^s @ 23° 0.8813 ^{a1} @ 21° 0.8780 ⁴³ @ 21° 0.8758 ¹²	1.4767 ^{a1} @ 21° 1.4728 ⁴³ @ 21° 1.47491 ^s 1.4728 ¹² 1.4749 ¹² @ 15°	

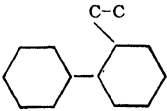
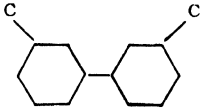
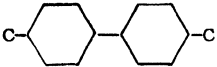
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclopentylcyclohexylmethane 		225 to 227 ⁶⁵ 223 to 225 ⁴² 224 to 226 ^{9,11} @ 750mm	0.8721 ^{9,11} @ 23° 0.8681 ⁴² 0.8789 ⁶⁵ @ 19°	1.4671 ^{9,11} @ 23° 1.47131 ⁴² 1.4775 ⁶⁵ @ 19°	
(2-Methylcyclopentyl)-cyclohexane (1-Methyl-2-cyclohexyl-cyclopentane) 		225.5 to 227 ⁶⁴ @ 744mm	0.8680 ⁶⁴	1.4701 ⁶⁴	
(3-Methylcyclopentyl)-cyclohexane (1-Methyl-3-cyclohexyl-cyclopentane) 		231 to 233 ⁶¹	0.8902 ⁶¹ @ 17°	1.4787 ⁶¹ @ 17°	

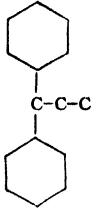
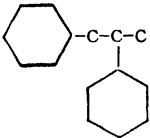
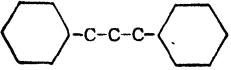
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
(2-Methylcyclopentyl)- cyclohexylmethane 		239 to 241 ⁴²	0.8712 ⁴²	1.47369 ⁴²	
1-Cyclopentyl-2-cyclo- hexylethane 		251 to 252 ¹⁰ @ 752.5mm 74 to 76 ⁴⁵ @ 2mm	0.8780 ¹⁰ @ 21° 0.8746 ⁴⁵	1.4775 ¹⁰ @ 21° 1.4723 ⁴⁵	
C₁₄H₂₆ 1-Cyclopentyl-3-cyclo- hexylpropane 		268 to 270 ¹⁰ @ 748.2mm	0.8751 ¹⁰	1.4765 ¹⁰	

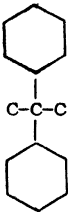
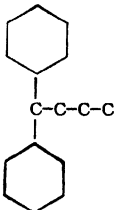
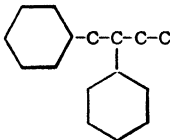
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclohexylcyclohexane (Dicyclohexyl) 		235	0.8846	1.4796	$\frac{dn}{dt} = -0.000485/^\circ\text{C}.$ (15° to 25°)
	- 1 ⁶⁷	233.5 to 235 ⁴¹	0.8833 ²⁷	1.4772 ²⁷	
	0 ¹⁹	@ 762mm	@ 25°	@ 25°	
	2 ¹⁹	240 to 241 ²⁰	0.8947 ¹⁹	1.4740 ³⁹	
	2.25 ¹⁹	239.5 to 240 ⁶⁶	@ 21.8°	1.4766 ⁶⁹	
	2.75 ³⁵	238 to 239 ¹²	0.8862 ¹⁹	1.4785 ⁶⁷	
	4 ^{18,50}	236.5 to 237.5 ⁶⁸	@ 20.6°	1.4792 ^{5,41}	
			0.8790 ³⁹	1.4795 ¹²	
		236 to 237.5 ²³	0.8804 ⁵	1.4798 ⁶⁶	
		235 ²⁹	0.8835 ²³	1.4800 ^{14,66}	
		234 to 236 ⁴⁶	0.8845 ⁴¹	1.4842 ⁸⁴	
		234 to 235 ⁴	0.8847 ⁶⁶	1.477 ^{49,50}	
		234 ^{3,18}	0.8848 ¹²	@ 19°	
		233 to 234 ⁵⁰	0.8912 ⁶⁴	1.4815 ²²	
		233 ⁴⁹	0.8919 ²³	@ 18°	
		231 to 233 ²⁷	0.877 ⁶⁶	1.4817 ¹²	
		227 ⁶⁹	D_{20}^{20}	@ 15°	
		220 to 228 ⁵	0.880 ¹⁴	1.47967 ¹⁹	
		236 to 238 ³⁵	D_{20}^{20}	$n_{H_2O}^{21.1}$	
		@ 757.5mm	0.8644 ³⁰	1.47977 ¹⁹	
		237 to 238.5 ²³	D_0^{20}	$n_{H_2O}^{21.1}$	
		@ 757mm	0.8876 ¹⁹	1.4795 ¹⁹	
		236 to 238 ⁶⁴	@ 19.6°	$n_{H_2O}^{20}$	
		@ 754mm	0.873 ^{49,50}		
		234 to 236 ³⁰	D_0^{19}	1.4802 ¹⁹	
		@ 752mm	0.8777 ³⁰	$n_{H_2O}^{20}$	
		216 to 219 ⁴⁰	@ 0°	1.4803 ¹⁹	
		@ 739mm	0.923 ⁴⁸	$n_{H_2O}^{20}$	
		234 ¹⁹	D_0^0		
		@ 736mm			
		233 ¹⁹			
		@ 736mm			
		232.5 ¹⁹			
		@ 736mm			
		124 ⁴⁸			
		@ 20mm			
		105 ⁶⁷			
		@ 15mm			

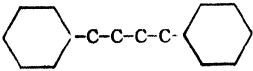
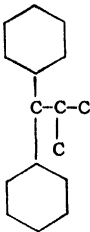
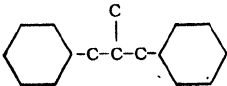
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Dicyclohexylmethane 		251 250 to 252 ²⁴ @ 763mm 251.5 ¹³ 250 to 252 ⁶⁷ 250 to 251 ⁴⁹ 150 ¹³ @ 45mm 110 to 110.5 ¹ @ 18mm	0.8808 0.8342 ¹³ @ 79.5° 0.8884 ¹ 0.8750 ⁶⁷ 0.8851 ²¹ D ₃₀ ²⁰ 0.8829 ⁵¹ D ₀ ²⁰ 0.8743 ²¹ D ₀ ²⁰ 0.8765 ¹³ @ 19.7°	1.4755 ²¹ @ 21° 1.4752 ⁶⁷ 1.4875 ¹ 1.4786 ²¹ 1.45053 ¹³ n _{H_a} ^{79.5} 1.47475 ¹³ n _{H_a} ^{19.7} 1.45862 ¹³ n _{H_β} ^{79.5} 1.48328 ¹³ n _{H_β} ^{19.7} 1.46336 ¹³ n _{H_γ} ^{79.5} 1.48828 ¹³ n _{H_γ} ^{19.7}	$\frac{dD}{dt} = -0.000783/^\circ\text{C.}$ (20° to 80°)
2-Methyl-1-cyclohexyl-cyclohexane (2-Methyldicyclohexyl) 		131 to 133.5 ¹⁷ @ 20mm	0.9058 ¹⁷ 0.9203 ¹⁷ @ 0°	1.4968 ¹⁷	
3-Methyl-1-cyclohexyl-cyclohexane (3-Methyldicyclohexyl) 		243 to 243.5 ⁴³ 240 ³⁴	0.88668 ⁴³ 0.9138 ⁴³ @ 18° 0.9634 ³⁴ @ 0°	1.4840 ⁴³ 1.492 ³⁴	

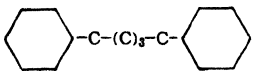
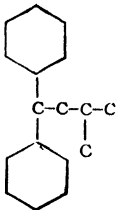
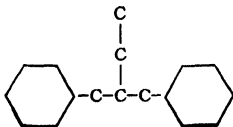
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,1-Dicyclohexylethane 		256 to 257 ^{49, 50, 51} 264 to 265 ⁶⁰ @ 740mm 112 @ 7mm ¹	0.9070 ¹ @ 25° 0.9271 ⁵¹ 0.9130 ⁴⁹ D_0^{20}	1.4887 ¹ @ 25° 1.500 ⁴⁹ 1.511 ⁵¹	
1,2-Dicyclohexylethane 		263 to 264 ¹⁸ 274 to 275.5 ²⁰ 273 ¹² 270 to 271 ^{49, 50} 266 to 268 ⁶⁰ @ 748mm 145 to 150 ¹⁸ @ 20mm 133 to 134 ⁵⁴ @ 13.5mm 147 to 148.5 ¹ @ 12mm 132 ⁸ @ 8mm 93 to 94 ⁴⁶ @ 2mm	0.877 ₀ 0.8758 ⁸ D_{25}^{25} 0.8795 ⁴⁶ 0.8760 ¹² 0.8772 ⁵⁴ D_{20}^{20} 0.8838 ^{49, 50} D_0^{18} 0.8774 ¹ @ 18°	1.4768 1.4749 ⁸ @ 25° 1.4765 ⁴⁶ 1.480 ^{49, 50} @ 18° 1.4760 ¹ @ 18° 1.4790 ¹² @ 15°	$\frac{dn}{dt} = -0.00041/^\circ\text{C.}$ (15° to 25°)

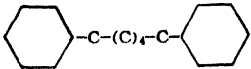
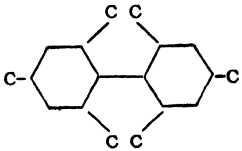
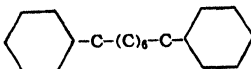
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	n_D^{20}	n_D^0	Additional Data
2-Ethyl-1-cyclohexyl-cyclohexane (2-Ethylbicyclohexyl) 		141 to 142.5 ¹⁷ @ 20mm	0.9126 ¹⁷ 0.9240 ¹⁷ @ 0°	1.4964 ¹⁷	
1-3-Methyl-1-(3-methyl-cyclohexyl)-cyclohexane (3,3' Dimethylbicyclohexyl) 		264 ³¹ @ 761mm 148 to 149 ³¹ @ 30mm	0.8803 ³¹ D_{20}^{20} 0.8789 ³¹ D_0^{20} 0.8924 ³¹ D_0^0		$[\alpha]_D = -3.44^\circ$ ³¹
4-Methyl-1-(4-methyl-cyclohexyl)-cyclohexane (4,4' Dimethylbicyclohexyl) 		240 to 242 ⁵⁸			

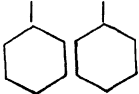
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,1-Dicyclohexyl- propane 		270 to 271 ^{49,52}	0.8887 ^{49,52} D ₀ ²³ 0.9038 ^{49,52} D ₀ ⁰	1.485 ^{49,52} @ 23°	$\frac{dD}{dt} = -0.0006_8/^\circ\text{C.}$ (0° to 20°)
1,2-Dicyclohexyl- propane 		272 to 273 ^{49,52}	0.8725 ^{49,52} D ₀ ²¹ 0.8891 ^{49,52} D ₀ ⁰	1.479 ^{49,52} @ 21°	$\frac{dD}{dt} = -0.0007_9/^\circ\text{C.}$ (0° to 20°)
1,3-Dicyclohexyl- propane 	- 30 ¹⁶	291 to 292 ¹⁶ 289 to 290 ^{49,52}	0.8752 ¹⁶ D ₂₄ ²⁴ 0.8701 ^{49,52} D ₀ ²¹ 0.8874 ^{49,52} D ₀ ⁰	1.4736 ¹⁶ @ 24° 1.475 ^{49,52} @ 21°	$\frac{dD}{dt} = -0.0008_2/^\circ\text{C.}$ (0° to 20°)

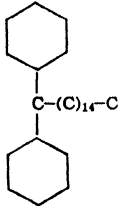
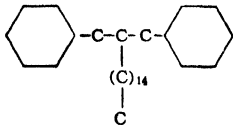
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
2,2-Dicyclohexyl- propane 		273 to 274 ^{49,53}	0.9002 ^{49,52} D_0^{23} 0.9158 ^{49,52} D_0^0	1.490 ^{49,52} @ 23°	$\frac{dD}{dt} = -0.0006_4/^\circ\text{C.}$ (0° to 20°)
C₁₈H₃₀ 1,1-Dicyclohexyl- butane 		280 to 282 ^{49,53}	0.8842 ^{49,53} D_0^{16} 0.8922 ^{49,53} D_0^0	1.485 ^{49,53} @ 16°	
1,2-Dicyclohexyl- butane 		276 to 278 ^{49,53}	0.9084 ^{49,53} D_0^{18} 0.9104 ^{49,53} D_0^0	1.500 ^{49,53} @ 18°	

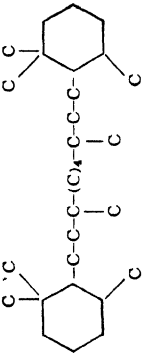
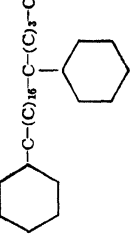
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,4-Dicyclohexyl- butane 	9 ⁵³ 12 ²⁸	304 to 306 ⁵³ 294 ²⁸ @ 725mm	0.8772 ⁵³ D ₀ ²¹	1.475 ⁵³ @ 21°	
2-Methyl-1,1-dicyclo- hexylpropane 		278 to 279 ^{49,53}	0.8906 ^{49,53} D ₀ ¹⁵ 0.9017 ^{49,53} D ₀ ⁰	1.492 ^{49,53} @ 15°	$\frac{dD}{dt} = -0.0007/^\circ\text{C.}$ (0° to 15°)
2-Methyl-1,3-dicyclo- hexylpropane 		290 to 292 ^{49,53}	0.8840 ^{49,53} D ₀ ¹⁹ 0.8916 ^{49,53} D ₀ ⁰	1.484 ^{49,53} @ 19°	

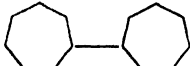
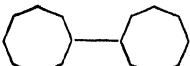
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,5-Dicyclohexylpentane 		315 ²⁵ 311 ^{49,53}	0.8719 ^{49,53} D_6^{21} 0.8836 ²⁹ @ 0° 0.8832 ^{49,53} D_6^0	1.479 ^{49,53} @ 21° 1.478 ²⁵	$\frac{dD}{dt} = -0.0005/^\circ\text{C}.$
3-Methyl-1,1-dicyclohexylbutane 		290 to 291 ^{49,53}	0.8940 ^{49,53} D_6^{21} 0.9058 ^{49,53} D_6^0	1.489 ^{49,53} @ 21°	$\frac{dD}{dt} = -0.0005/^\circ\text{C}.$ (0° to 20°)
2-Ethyl-1,3-dicyclohexylpropane 		296 ^{49,53}	0.8846 ^{49,53} D_6^{21} 0.8966 ⁴⁹ D_6^0	1.483 ^{49,53} @ 21°	$\frac{dD}{dt} = -0.0005/^\circ\text{C}.$ (0° to 20°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1,6-Dicyclohexylhexane 		212 ²⁸ @ 14mm			
2,4,6-Trimethyl-1-(2,4,6-trimethylcyclohexyl)-cyclohexane (2,4,6,2',4',6' Hexamethyldicyclohexyl) 		123 to 126 ² @ 3mm	0.8932 ² D ₄₆ ²⁵	1.4873 ² @ 25°	
C₂₀H₃₈ 1,8-Dicyclohexyloctane 	26 ²⁸				

<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
Bis-(1-Methyl-4-isopropyl)-cyclohexane (Dimenthyl)	105.5 to 106 ²⁹	217 to 220 ²⁹ @ 40mm 195 to 197 ²⁹ @ 30mm 185 to 186 ²⁹ @ 21mm 199 to 202 ²⁹ @ 21mm	0.8925 ²⁹ <i>D</i> ₂₀ ²⁰ 0.8911 ²⁹ <i>D</i> ₀ ²⁰		
C₂₄H₄₆ 5,8-Dicyclohexyldodecane $\text{C}-(\text{C})_8-\text{C}-\text{C}-\text{C}-\text{C}-(\text{C})_8-\text{C}$ 		170 ⁷ @ 0.2mm	0.8823 ⁷ @ 15°		

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,1-Dicyclohexylhexadecane 	18.5 to 19.5 ³²	269 to 271 ³² @ 15mm 260 to 264 ³² @ 10mm	0.8791 ³²	1.48620 ³² @ 17.5°	
C₃₀H₅₈ 1,3-Dicyclohexyl-2-pentadecylpropane (1-Cyclohexyl-2-hexahydrobenzylheptadecane) 		288 to 290 ³² @ 17mm 279 to 281 ³² @ 10mm	0.8860 ³²	1.4911 ³² @ 15°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,8-Dimethyl-1,10-di-(2,2,6-trimethylcyclohexyl)-decane 		166 to 168 °C. @ 0.025mm	0.8860 °C. @ 17.3°	1.48583 °C. @ 17.3°	
C₃₈H₇₈ 1,18-Dicyclohexyldocosane 		255 to 260 °C. @ 1mm			

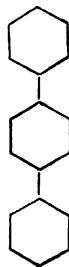
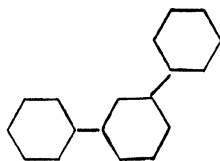
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cycloheptylcycloheptane (Dicycloheptyl) 		290 to 291 ³³ 290 to 291 ³⁶ @ 728mm	0.9069 ³⁶ D ₀ ²⁰ 0.9195 ³⁶ D ₀ ⁰		$\frac{dD}{dt} = -0.00064/^{\circ}\text{C.}$ (0° to 20°)
C₁₈H₃₀ Cyclooctylcyclooctane (Dicyclooctyl) 		140 ⁴⁷ @ 1mm	0.9277 ⁴⁷ 0.9292 ⁴⁷ @ 18.2°	1.5018 ⁴⁷	
C₃₀H₅₈ Cyclopentadecylcyclopentadecane (Dicyclopentadecyl)	44 ⁴⁷		0.866 ⁴⁷ @ 100° 0.8728 ⁴⁷ @ 88.6°	1.4748 ⁴⁷ @ 100°	$\frac{dD}{dt} = -0.0006/^{\circ}\text{C.}$ (85° to 100°)

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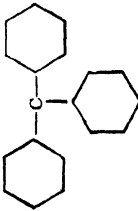
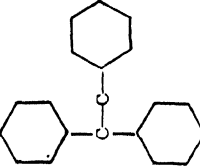
IV. TRI-, TETRA-, AND PENTACYCLANES, C_nH_{2n-4} , C_nH_{2n-6} , C_nH_{2n-8}

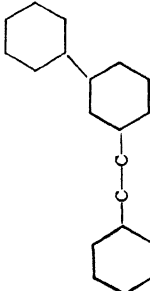
Name and Carbon Skeleton	<i>M. P.</i> , °C.	<i>B. P.</i> , °C. @ 760mm	<i>D</i> ₄ ²⁰	<i>n</i> _D ²⁰	Additional Data
1,3-Dicyclohexylcyclohexane	66 ¹² 66 to 67 ¹³	202 ¹³ @ 14mm 192 to 196 ¹³ @ 12mm 160 to 163 ¹⁰ @ 3mm	0.9121 ¹⁰	1.4938 ¹⁰	Isomeric forms separated by crystallizing from alcohol. Authors do not know what the difference is. * Isomers formed by hydrogenation of dicyclohexylbenzene. No explanation is given for the difference. *
1,4-Dicyclohexylcyclohexane	54 to 56 ⁵ 55 to 57 ³ 158 to 159 ¹ 162 ¹				

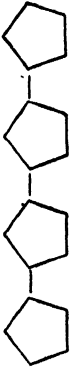
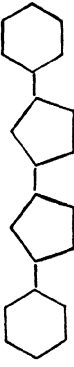


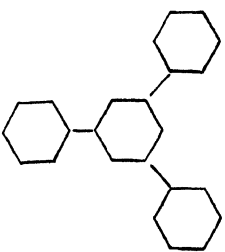
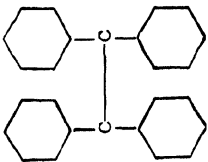
Isomer I

Isomer II

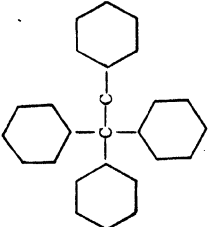
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Tricyclohexylmethane 	48 to 48.5 ° 61 ° .	340 to 345 ° 322 to 329 ° 140 @ 20mm 180 ° @ 12mm 164 to 165 ° @ 3mm 161 to 163 ° @ 2mm	0.9274 ° @ 50° 0.9263 ° D ₆ ²⁰	1.4965 ° @ 50° 1.4986 ° @ 40°	
1,1,2-Tricyclohexylethane 		191 to 192 ° @ 8mm	0.9301 ° @ 25°	1.5030 ° @ 25°	

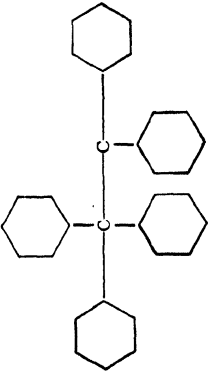
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Cyclohexyl-2-(3-cyclohexylcyclohexyl)- ethane 		192 ° @ 8.5mm	0.9257 °	1.49963 ° 1.49708 ° n _D ²⁰ H _a 1.50573 ° n _D ²⁰ H _β 1.46170 ° n _D ²⁰ H _γ	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<p>3,3'-Dicyclopentylidicyclopentyl</p> 		205 to 207 ° @ 9mm			
<p>$C_{22}H_{36}$ 3,3'-Dicyclohexylidicyclopentyl</p> 		180 ° @ 0.1mm	0.9592 ° @ 18°	1.51290 °	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<p>1,3,5-Tricyclohexylcyclohexane</p> 	<p>159 to 160 ^{2,14} 158 to 159 ^s</p>	<p>228 to 228.5 ^{2,14} @ 3.5mm</p>			
<p>1,1,2,2-Tetracyclohexylethane</p> 	<p>158 to 159 ¹⁴</p>				

 $C_{28}H_{46}$

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<p>1,1,1,2-Tetracyclohexylethane</p> 	112 to 114 ¹⁴		0.9636 ¹⁴ D_{25}^{25}	1.5217 ¹⁴ @ 25°	$[\alpha]_D^{20} = +25.1^{\circ 14}$


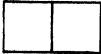
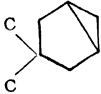
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<p style="text-align: center;">Pentacyclohexylethane</p> 	191 to 192 ¹⁴				

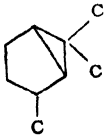

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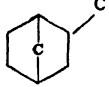
V. BICYCLANES OR BICYCLOPARAFFINS

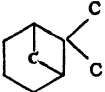
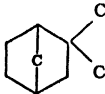
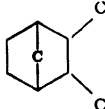
1. Bicyclanes with an alkyl substitution, C_nH_{2n-2}
2. Bicyclanes with an alkenyl or olefin substitution, C_nH_{2n-4}
3. Bicyclanes with two alkenyl or one alkadienyl substitution.


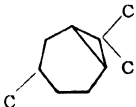
1. BICYCLANES OR BICYCLOPARAFFINS WITH
ALKYL SUBSTITUTIONS, C_nH_{2n-2} C_8H_{14}

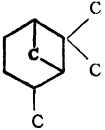
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
[0,1,3]-Bicyclohexane 		78 to 79.5 ¹¹⁷ @ 750mm 80 to 81 ¹¹⁶ @ 748mm	0.8144 ¹¹⁷	1.4309 ¹¹⁷ @ 21.5° 1.4320 ¹¹⁷ 1.4337 ¹¹⁶ @ 17°	
[0,2,2]-Bicyclohexane 		78.5 to 79.5 ⁸⁶ @ 732mm	0.8245 ⁸⁶ @ 19°	1.4475 ⁸⁶ @ 19°	
C_8H_{14} 5,5-Dimethyl- [0,1,3]^(1,3)-bicyclohexane 		115.2 to 115.4 ⁹⁸ 115 ¹²⁴ 114.0 to 114.1 ⁷⁷ @ 740mm	0.8125 ⁹⁸ 0.7962 ¹²⁴ 0.7929 ^{123, 124} 0.7976 ¹²⁴ D_{20}^{20}	1.4385 ⁹⁸ 1.4331 ¹²⁴ 1.4329 ^{123, 124}	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
2,2,4-Trimethyl- [0,1,3]^(1,3)-bicyclo- hexane 		137 to 138 ⁴¹ 138.5 to 139 ³⁹ @ 759mm 140.5 ³⁹ @ 752mm	0.8223 ³⁹ D_0^{20}	1.4465 ³⁹ @ 18.5°	
C₁₀H₁₈ 4-Methyl-1-isopropyl- [0,1,3]^(1,3)-bicyclo- hexane (Thujane) (Tanacetane) 		158 to 159 ¹¹⁴ @ 765mm 157 to 160 ²² 157 to 158 ²² 156 to 157 ^{18,19} 155 to 156 ^{18,19} 157 ³⁸ @ 759mm 157 ⁹⁷ @ 758mm 156.2 to 156.8 ⁷³ @ 756mm 156 to 157 ⁹¹ @ 747mm 157.5 to 158 ³⁷ @ 741mm	0.8143 ¹⁸ D_{26}^{26} 0.8158 ^{18,91} D_{21}^{22} 0.8140 ¹⁹ @ 22° 0.8181 ^{22,97} 0.8139 ⁹⁷ 0.8171 ³⁸ D_0^{20} 0.8161 ³⁷ D_0^{20} 0.8142 ⁷⁰ @ 19.5° 0.8190 ^{22,97} @ 17° 0.8191 ⁹⁷ @ 16° 0.8161 ⁹⁷ @ 16°	1.440 ¹⁸ @ 26° 1.44121 ^{18,91} @ 22° 1.43939 ⁷³ @ 20.2° 1.4440 ²² 1.4435 ¹⁹ 1.4410 ¹⁹ 1.4400 ³⁸ 1.4399 ¹¹⁴ 1.4398 ³⁷ 1.43759 ⁹⁷ 1.44393 ^{22,97} @ 17° 1.44102 ⁹⁷ @ 16° 1.43708 ⁷³ $n_{H_a}^{20,2}$ 1.44495 ⁷³ $n_{H_\beta}^{20,2}$ 1.44983 ⁷³ $n_{H_\gamma}^{20,2}$	$[\alpha]_D^{20} = +8.48^\circ$ ^{19,22}

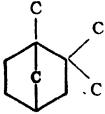
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
[0,1,4]-Bicycloheptane (Norcarane) 		111 to 112 ¹²	0.8391 ¹² @ 23°	1.4544 ¹² @ 23°	
[1,2,2]-Bicycloheptane (Norbornylane) 	86 to 87 ⁴³				
C_8H_{14} 2-Methyl-[1,2,2]^(1,4)-bicycloheptane 		I 125 to 126.5 ¹¹³ @ 761mm 124.5 to 126 ¹¹³ @ 745mm	0.8532 ¹¹³ @ 20.5° 0.8561 ¹¹³ @ 16.5°	1.4535 ¹¹³ @ 20.5° 1.4553 ¹¹³ @ 16.5°	
II		121 to 123.5 ¹¹³ @ 745mm	0.8537 ¹¹³ @ 16.5°	1.4545 ¹¹³ @ 16°	

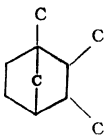
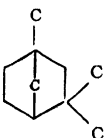
<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
2,2-Dimethyl-[1,1,3]^(1,3)-bicycloheptane (Nopinane) 		149 ⁹¹ @ 747mm	0.8611 ⁹¹ <i>D</i> ₁₂ ²²	1.46141 ⁹¹ @ 22°	
2,2-Dimethyl-[1,2,2]^(1,4)-bicycloheptane (Camphenilane) 	15 to 16 ⁶⁴ 17 ⁴⁴	142 ⁴⁴ 142.5 ⁶⁴ @ 753mm	0.8547 ⁶⁴ 0.8539 ⁴⁴	1.4555 ⁶⁴ 1.4534 ⁴⁴	
2,3-Dimethyl-[1,2,2]^(1,4)-bicycloheptane (Dihydrosantene) 			0.8712 ¹⁰ @ 18.5°	1.4636 ¹⁰ @ 18.6°	

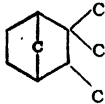
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
7,7-Dimethyl-[1,2,2]-bicycloheptane (Apofenchane) 	17 to 17.5 ⁴⁴	143.5 ⁴⁴	0.8538 ⁴⁴	1.45414 ⁴⁴	
C₁₀H₁₈ 2,2,5-Trimethyl-[0,1,4]-(1,3)-bicycloheptane (Carane) 		169.5 ⁴⁰ @ 759mm 165 to 166 ⁹¹ @ 750mm 168 to 168.5 ¹¹⁴ @ 748.5mm 162 ²⁰ @ 684mm 105 to 106 ⁴⁷ @ 116mm 49 to 50 ⁹¹ @ 9mm	0.836 ²⁰ D_{28}^{28} 0.8410 ⁴⁰ D_0^{20} 0.8381 ⁹¹ D_{20}^{20}	1.455 ²⁰ @ 26° 1.4551 ¹¹⁴ @ 24° 1.45823 ^{40, 91} 1.4573 ¹¹⁴ @ 19°	$[\alpha]_D = -34^\circ$ ⁹¹

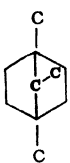
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,2,4-Trimethyl- [1,1,3]^(1,3)-bicyclo- heptane (Pinane) <i>d</i> form 	- 45 ^{99,100}	166 ¹⁰⁰ 166 ⁹⁹ @ 755mm 163 to 164* ^{55,85,125} @ 720mm	0.8566 ^{17, 55, 85, 125} 0.861 ^{99,100} D ₁₆ ¹⁵	1.4624 ^{17, 55, 85, 125}	$[\alpha]_{578} = +23.8^{\circ 100}$ $[\alpha]_D = +23.08^{\circ 55,85,125}$ $[\alpha]_D = +22.7^{\circ 99}$ *Lipp ⁵² states that he has determined that this is the <i>cis</i> isomer of pinane. He also states that the <i>cis</i> compound is what Sabatier and Senderens ⁷⁹ have isolated.

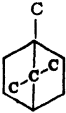
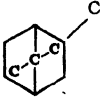
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (v) 760mm	D_4^{20}	n_D^{20}	Additional Data
2,2,4-Trimethyl- [1,1,3]^(1,3)-bicyclo- heptane					$[\alpha]_D = -1.25^\circ_{64}$
(Pinane) l form	- 50 ⁹⁹	168 to 168.5 ¹⁰⁹ 166 ⁸⁵ 164.8 to 165.8 ⁵⁵ 163.5 to 165 ¹⁰⁷ @ 758mm 166 ⁹⁹ @ 755mm 163.5 to 165 ¹⁰⁹ @ 750mm 168 to 169 ⁸³ @ 748mm 167.5 to 168 ¹⁰⁹ @ 748mm 165.5 to 166 ⁵⁸ @ 721mm 162 to 164 ^{55,106} @ 720mm 162 to 164 ⁸⁷ @ 719mm 164.8 to 165.8 ¹⁰⁶ @ 716mm	0.8550 ⁸⁷ @ 20.5° 0.8567 ¹⁰⁹ 0.8562 ^{55,106} 0.8542 ¹⁰⁹ 0.8512 ¹⁰⁹ 0.8390 ⁸³ 0.8607 ¹⁰⁷ D_{20}^{20} 0.8519 ^{55,106} @ 17.5° 0.8620 ⁸⁵ @ 0°	1.4620 ^{55,106} 1.4605 ¹⁰⁹ 1.4601 ¹⁰⁹ 1.4580 ¹⁰⁹ 1.4540 ⁸³ 1.4648 ¹⁰⁷ @ 19° 1.4630 ⁸⁷ @ 19° 1.45952 ⁵⁵ @ 17.5° 1.4595 ¹⁰⁶ @ 17.5°	$[\alpha]_D = -9.58^\circ_{109}$ $[\alpha]_D = -13.3^\circ_{109}$ $[\alpha]_D = -16.1^\circ_{55,106}$ $[\alpha]_D = -17.62^\circ_{87}$ $[\alpha]_D = -18.9^\circ_{55,106}$ $[\alpha]_D = -19.84^\circ_{109}$ $[\alpha]_D^{20} = -20.55^\circ_{107}$ $[\alpha]_D = -21.3^\circ_{99}$

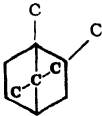
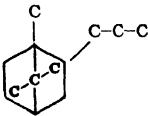
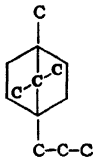
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,2,4-Trimethyl- [1,1,3]^(1,3)-bicyclo- heptane (Pinane) Unspecified optical activity		169 to 170 ¹¹⁵ @ 768mm 164.5 to 165 ⁶⁸ @ 763mm 166 to 168 ¹¹⁵ @ 752mm 165 to 169 ⁶⁹ @ 752mm 165 to 169.5 ⁶⁹ @ 752mm 168.5 ¹¹⁵ @ 748mm 163.5 to 164 ⁶⁸ @ 747mm 167 to 167.5 ¹¹⁴ @ 737mm	0.8467 ¹¹⁵ @ 21° 0.8558 ⁶⁸ 0.8551 ⁶⁸ 0.8521 ¹¹⁴ 0.8430 ⁶⁹ 0.8402 ⁶⁹ 0.8453 ¹¹⁵ @ 18.5° 0.8470 ¹¹⁵ @ 18°	1.4605 ¹¹⁴ @ 21° 1.4554 ¹¹⁵ @ 21° 1.4611 ⁶⁸ 1.4609 ⁶⁸ 1.4572 ⁶⁹ 1.4559 ⁶⁹ 1.4589 ¹¹⁵ @ 18°	
1,2,2-Trimethyl- [1,2,2]^(1,4)-bicyclo- heptane 	116 to 117 ⁶⁸				

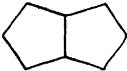


Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2,3-Trimethyl- [1,2,2]^(1,4)-bicyclo- heptane (1-Methyldihydrosantene) <div>  </div>		159 to 160 ⁴⁶	0.8520 ⁴⁶		
1-1,3,3-Trimethyl- [1,2,2]^(1,4)-bicyclo- heptane (Fenchane) <div>  </div>		151 to 152 ⁴⁴ @ 765mm 151.5 ³⁸ @ 763mm 145 to 147 ⁷⁸ 149.2 to 149.5 ^{62,65} @ 753mm 149 ¹⁰⁴ @ 750mm 149 to 149.3 ⁴⁷ @ 749mm	0.8345 ⁴⁴ 0.8337 ⁷⁸ 0.8317 ^{62,65} 0.8316 ¹⁰⁴ 0.8326 ³⁸ D ₀ ²⁰ 0.8471 ⁶² @ 0°	1.44752 ⁷⁸ 1.44714 ⁴⁴ 1.4463 ³⁸ 1.4462 ¹⁰⁴ 1.4459 ^{62,65}	[α] _D = -18.11° ¹⁰⁴ [α] _D = -18° ⁶² [α] _D = -16.53° ³⁸ [α] _D = -15.22° ⁷²

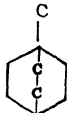
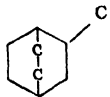
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
d-1,3,3-Trimethyl- [1,2,2]^(1,4)-bicyclo- heptane (d-l-α-Fenchane)		161 to 163 ⁴² @ 755mm	0.8612 ⁴²	1.46152 ⁴² 1.45921 ⁴² <i>n</i> _{H_a} ²⁰ 1.46741 ⁴² <i>n</i> _{H_β} ²⁰ 1.46740 ⁴² <i>n</i> _{H_γ} ²⁰	
dl-1,3,3-Trimethyl- [1,2,2]^(1,4)-bicyclo- heptane (d-l-β-Fenchane)		158 to 160 ⁴² @ 752mm	0.8553 ⁴²	1.45744 ⁴² 1.45511 ⁴² <i>n</i> _{H_a} ²⁰ 1.46304 ⁴² <i>n</i> _{H_β} ²⁰ 1.47208 ⁴² <i>n</i> _{H_γ} ²⁰	
2,2,3-Trimethyl- [1,2,2]^(1,4)-bicyclo- heptane (Isocamphane) <i>d</i> form <div style="text-align: center;">  </div>	62 to 63 ⁵⁴ 61.5 to 63 ⁵⁴	166 to 166.5 ⁵⁴			[α] _D = +8.68° ⁵⁴

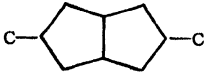
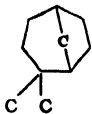
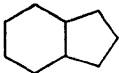
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,2,3-Trimethyl- [1,2,2]-(1,4)-bicyclo- heptane <i>l</i> form	63 to 64.5 ⁵⁴	164 ⁵⁴ @ 757mm			[α] _D = -8.5° ⁵⁴
2,2,3-Trimethyl- [1,2,2]-(1,4)-bicyclo- heptane optical activity unspecified	65 to 66 ⁵⁴ 60 to 61 ¹⁰⁸	163 ⁵⁴ 164.5 ⁵⁴ @ 709mm	0.82757 ⁵⁴ @ 67°	1.44186 ⁵⁴ @ 67° 1.43982 ⁵⁴ <i>n</i> _D ⁶⁷ _a 1.45239 ⁵⁴ <i>n</i> _D ⁶⁷ _γ	
1,4,7-Trimethyl- [1,2,2]-(1,4)-bicyclo- heptane (4-Methylsantene)		152 to 154 ⁴⁶	0.8531 ⁴⁶		
					

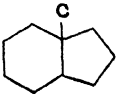
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,7,7-Trimethyl- [1,2,2]^(1,4)-bicyclo- heptane (Camphane) <div>  </div>	145 ⁴⁸ 153 to 154 ^{90, 106} 156 to 157 ^{104, 106} 157 to 158 ⁶¹ 158 to 159 ³⁸ 151 ¹¹⁴ 151 to 152 ²³ 150 ²¹	160 to 161 ³⁸ @ 763mm 160 to 161 ⁹⁰ 161 to 162 ²¹ 161 ^{97, 105} @ 757mm	0.7458 ⁴⁸ @ 152°		
2,7,7-Trimethyl- [1,2,2]^(1,4)-bicyclo- heptane (Isobornylane) <div>  </div>		163.5 to 164.5 ⁶⁵ @ 753mm 162 to 163.5 ¹¹⁴ @ 753mm 162.5 to 163.5 ¹⁰⁸ @ 751mm	0.8579 ⁶⁵ 0.8566 ^{108, 114}	1.4590 ⁶⁵ 1.4577 ¹¹⁴ 1.4560 ¹⁰⁸ 1.4559 ¹¹⁴ @ 19.5°	[α] _D = -12.36° ⁶⁶ [α] _D = -8.16° ¹¹⁴

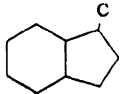
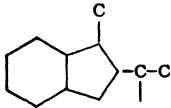
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2,7,7-Tetramethyl- [1,2,2]^(1,4)-bicyclo- heptane (?) (Methylcamphane)	138 to 139 ^{66,67}	170 to 170.5 ^{66,67} @ 752mm	0.8160 ⁶⁶ @ 10°	1.46235 ⁶⁶ @ 16°	
					
C₁₃H₂₄ 1,7,7-Trimethyl-2- propyl-[1,2,2]^(1,4)- bicycloheptane (2-Propylcamphane)	32 to 32.5 ⁷⁰	223 to 223.5 ⁷⁰			
					
1,7,7-Trimethyl-4- propyl-[1,2,2]^(1,4)- bicycloheptane (4-Propylcamphane)	32 to 32.5 ⁷⁰	223 to 223.5 ⁷⁰			
					

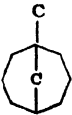
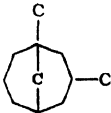
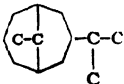
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
[0,3,3]-Bicycloöctane <i>cis</i> 		127 to 135 ¹¹²	0.8241 ¹¹²	1.4471 ¹¹²	
[0,3,3]-Bicycloöctane <i>trans</i>	- 30 ⁴	132 ⁴ @ 762mm	0.8626 ⁶ @ 18° 0.867 ⁴ @ 14°	1.4625 ⁶ @ 18° 1.4651 ⁴ @ 14°	
[1,2,3]-Bicycloöctane 	141 ²				
[2,2,2]-Bicycloöctane 	168 ¹¹ 169 to 170 ¹				

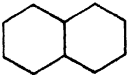
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
[0,x,x]-Bicyclooctane		139.5 to 140.5 ¹⁰³	0.8604 ¹⁰³ 0.8775 ¹⁰³ @ 0°	1.46148 ¹⁰³	
C ₈ H ₁₄ 1-Methyl-[2,2,2]^(1,4)-bicyclooctane 		149 to 151 ⁸⁹	0.875 ⁸⁹	1.46900 ⁸⁹	
2-Methyl-[2,2,2]^(1,4)-bicyclooctane 	33 to 34 ³⁶	157 to 158.5 ³⁶ @ 760.8mm	0.8674 ³⁶ @ 40.5°	1.4613 ³⁶ @ 40.5°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ³⁰	n _D ²⁰	Additional Data
3,7-Dimethyl- [0,3,3]^(1,4)-bicycloöctane 		165 to 167 ³⁴	0.8341 ³⁴ @ 24°	1.4481 ³⁴ @ 24°	
5,5-Dimethyl-[1,2,3]^(1,4)- bicycloöctane (Dihydroendocamphene) 		171.5 to 173 ⁵⁸	0.87706 ⁵⁸ @ 17.4°	1.46847 ⁵⁸ @ 17.4°	
C₁₀H₁₈ [0,3,4]-Bicyclononane (Hydrindane) <i>cis</i> 		166 ⁸⁰ 166 ¹²⁰ @ 758mm 166 ²⁹ @ 734mm	0.881₉ 0.8783 ²⁹ @ 25.1° 0.8815 ³⁰ @ 20.7° 0.880 ³⁰ 0.879 ³⁰ @ 16.8° 0.8849 ³⁰ @ 15.3° 0.8872 ³⁰ @ 11.7°	1.471 ₄ 1.4683 ¹²⁰ 1.4716 ³⁰ 1.4714 ³⁰ 1.4713 ³⁰ 1.47270 ³⁰ @ 16.8° 1.47500 ³⁰ @ 12° 1.46897 ²⁹ n _{H₂O} ^{24,9}	$\frac{dD}{dt} = -0.00064/^{\circ}\text{C.}$ (10° to 20°)

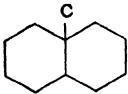
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
[0,3,4]-Bicyclononane					[α] ¹⁹ = -10.8° ⁴
<i>l trans</i>		159 ³⁰ 156 ⁴ @ 747mm	0.8630 ³⁰ 0.865 ⁴	1.4655 ⁴ @ 18.2°	
<i>dl trans</i>		159 to 160 ³⁰ 158 ⁸⁸	0.863 ⁸⁸ 0.8645 ³⁰ @ 18.3°	1.4643 ⁸⁸ 1.46630 ³⁰ n _{H₂} ^{14,6}	
[0,3,4]-Bicyclononane (Hydrindane) with no specification of <i>cis</i> and <i>trans</i> forms		165 to 166 ²³ @ 767mm 163.5 to 164.5 ¹¹¹ 166 to 167 ^{28,118}	0.8284 ¹⁸ @ 81.2° 0.8759 ¹⁸ @ 23° 0.8334 ³³ 0.8790 ¹¹¹ @ 15.5° 0.8872 ²⁸ @ 11.7°	1.46897 ⁴ @ 24.9° 1.4696 ¹¹⁸ 1.46287 ³³ 1.4711 ¹¹¹ @ 15.5° 1.4750 ^{4,28} @ 12°	
C₁₀H₁₈ <i>cis</i>-1-Methyl- [0,3,4]^(1,5)-bicyclo- nonane (8-Methyl hydrindane)	12 to 13 ¹⁴	69 @ 19mm ¹⁴ 56 ⁵³ @ 10.5mm	0.8778 ¹⁴ @ 16° 0.8754 ⁵³ @ 13.5°	1.4707 ¹⁴ @ 16° 1.4699 ⁵³ @ 13.5°	
					

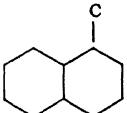
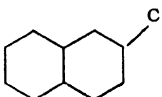
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-[0,3,4]^(1,5)-bicyclononane (8-Methyl hydrindane)		159 to 160 ⁷ 80 to 82 ⁵ @ 50mm			
2-Methyl-[0,3,4]^(1,5)-bicyclononane (1-Methyl hydrindane) <div style="text-align: center;">  </div>		182 to 183 ⁷¹	0.8763 ⁷¹	1.46934 ⁷¹	
C₁₃H₂₄ 2-Methyl-3-isopropyl-[0,3,4]^(1,5)-bicyclononane <div style="text-align: center;">  </div>		127 to 137 ¹¹ @ 28mm	0.8715 ¹¹	1.4660 ¹¹	

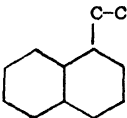
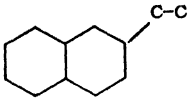
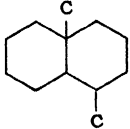
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-[1,3,3]^(1,5)-bicyclononane 		176 to 178 ⁷⁷ @ 751mm	0.8416 ⁷⁷	1.4529 ⁷⁷	
C₁₁H₂₀ 1,3-Dimethyl-[1,3,3]^(1,5)-bicyclononane 		195 to 200 ⁷⁸ @ 750mm			
C₁₃H₂₄ 9-Methyl-3-isopropyl-[1,3,3]^(1,5)-bicyclononane 		232 to 233 ⁷⁹ @ 755mm 132 ⁷⁹ @ 28mm	0.8643 ⁷⁹	1.4660 ⁷⁹	

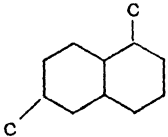
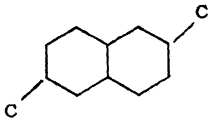
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
[0,4,4]-Bicyclodecane			0.895,	1.480,	
(Decahydronaphthalene)	- 43.26 ^{31,95}	193 ¹³ @ 768mm	0.898 ²⁴ 0.8963 ⁹⁶	1.4773 ⁷⁶ @ 22.5°	
(Decalin)	- 45 ²⁶	190.4 to 191.2 ³	0.8962 ⁸¹ 0.8957 ¹³	1.4823 ²⁴ 1.48113 ⁹⁶	
<i>cis</i>	- 51 ²⁵	@ 764mm	0.8953 ¹³	1.48054 ²⁵	
		190.2 to 190.4 ⁸⁰ @ 763mm	0.8952 ^{25, 119}	1.4805 ^{27, 119}	
		193.8 ⁸¹ @ 763mm	0.8951 ³ 0.895 ²⁷	1.48035 ³ 1.4803 ⁸¹	
		194.6 ⁹⁵	0.8838 ⁷⁵	1.4741 ⁷⁵	
		193 ^{13, 25, 110, 111}	0.8805 ⁷⁵	1.48279 ²⁵ @ 19°	
		192 to 193.6 ¹²²	0.8986 ²⁵ @ 19°	1.4815 ¹²⁰ @ 17.5°	
		189 to 191 ³²		1.47789 ³	
		188 to 192 ⁷⁵		n _H ¹⁸ _a	
		187 to 188 ⁴⁹		1.48638 ³	
		186 to 190 ⁷⁵		n _H ¹⁸ _β	
		188.5 to 190.5 ¹⁰² @ 717mm		1.49154 ³	
		72 ²⁴ @ 12mm		n _H ¹⁸ _γ	
		68 to 70 ⁸¹ @ 12mm		1.48068 ¹³ n _H ²⁰ _δ	

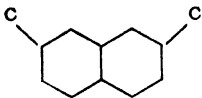
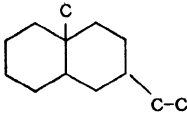
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
[0,4,4]-Bicyclodecane				1.469₆	
(trans)					
- 31.47 ⁹⁵	185 ¹³	0.8641 ²⁶	1.4871 ¹²²		
- 33 ²⁶	@ 765mm	@ 30°	@ 20.5°		
- 36 ²⁶	187 to 188 ⁴⁹	0.8714 ¹²¹	1.4713 ^{24,25}		
	186 to	@ 21°	1.46968 ⁹⁵		
	186.5 ¹²²	0.8704 ¹²²	1.4696 ¹¹⁹		
	185 ^{25,27}	@ 21°	1.46958 ²⁵		
	184 to	0.8715 ²⁵	1.4695 ^{27,78}		
	186.5 ¹²¹	@ 20.5°	1.4691 ⁸¹		
	182 to 184.5 ⁷⁵	0.8823 ¹³	1.4675 ⁴⁹		
	185.5 ⁹⁵	0.8820 ¹³	1.46994 ²⁷		
	185 ¹³	0.877 ⁴⁹	@ 18.2°		
	@ 756mm	0.872 ²⁴	1.47225 ²⁴		
63 ²⁴		0.8709 ²⁶	@ 18°		
@ 12mm		0.8699 ⁹⁵	1.46720 ⁹⁵		
62 to 63 ⁸¹		0.8695 ²⁵	n _H ²⁰ _a		
@ 12mm		0.8667 ⁸¹	1.46728 ²⁷		
		0.8657 ⁷⁵	n _H ^{18,2} _a		
		0.8734 ²⁵	1.47572 ²⁷		
		@ 19°	n _H ^{18,2} _β		
		0.8703 ²⁷	1.48727 ⁹⁵		
		@ 18.2°	n _H ²⁰ _γ		
		0.8783 ²⁶	1.48060 ²⁷		
		@ 10°	n _H ^{18,2} _γ		
		0.893 ⁴⁹	1.47461 ¹³		
		@ 0°	n _H ²⁰ _•		
			1.47442 ¹³		
			n _H ²⁰ _•		

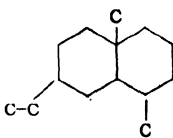
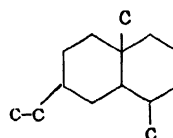
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
[0,4,4]-Bicyclodecane <i>cis</i> and <i>trans</i>		185 to 193 ³⁴ 188 to 191 ⁸⁸ 191.6 ¹⁸ 195 to 196 ¹⁵ 189 to 191 ³⁶ 189 to 190 ⁷⁴	0.8609 ¹⁵ @ 50° 0.9134 ¹⁵ @ 23° 0.8881 ³⁵ 0.884 ¹⁷ 0.8833 ¹⁵ 0.8781 ³⁴	1.4965 ¹⁵ @ 23° 1.4750 ¹⁵ 1.4753 ³⁵ 1.4771 ³⁴ 1.4773 ¹⁵ @ 15°	
C₁₁H₂₀ <i>cis</i>-1-Methyl-[0,4,4]^(1,6)-bicyclodecane 		82 @ 11mm ²⁴ 79 @ 11mm ⁵³	0.8909 ²⁴ @ 16.1° 0.8994 ⁵³ @ 12.5°	1.4813 ²⁴ @ 16.1° 1.4844 ⁵³ @ 12.5°	
<i>trans</i>-1-Methyl-[0,4,4]^(1,6)-bicyclodecane		75 @ 14mm ⁵¹ 70 to 71 ⁵¹ @ 12mm	0.8633 ⁵¹ 0.8583 ⁵¹ 0.8654 ²⁴ @ 17.6°	1.4631 ⁵¹ 1.4702 ⁵¹ @ 17.6° 1.4697 ²⁴ @ 17.6°	

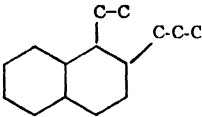
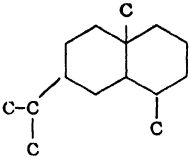
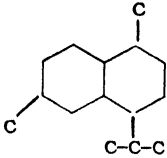
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-[0,4,4]^(1,6)-bicyclodecane (Mixture of <i>cis</i> and <i>trans</i> isomers)			0.892 ⁵³	1.481 ⁵³	
2-Methyl-[0,4,4]^(1,6)-bicyclodecane 		205 ¹⁰¹	0.885 ¹⁰¹ D ₂₀ ²⁰		
<i>trans</i>-3-Methyl-0,4,4^(1,6)-bicyclodecane 		78 @ 14mm ⁴ 76 @ 12mm ⁸¹	0.8670 ⁸¹	1.4681 ⁸¹	
3-Methyl-[0,4,4]-bicyclodecane		201 ¹⁰¹	0.876 ¹⁰¹ D ₂₀ ²⁰		

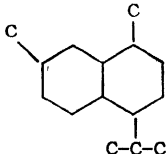
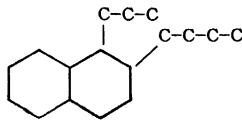
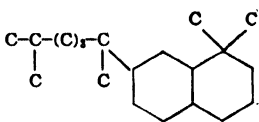
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Ethyl-[0,4,4]^(1,6)-bicyclodecane 		222 ⁵¹	0.8843 ⁵¹ @ 23° 0.8985 ⁵¹ D ₀ ⁰	1.4764 ⁵¹ @ 23°	
3-Ethyl-[0,4,4]^(1,6)-bicyclodecane 		222 ⁵² 221 ⁵⁰ 92 @ 13mm ⁵⁰	0.8763 ^{50,52} @ 13.2° 0.8857 ^{51,52} D ₀ ⁰	1.4746 ^{48,50} @ 13.2°	
cis-1,5-Dimethyl-[0,4,4]^(1,6)-bicyclodecane 		85 ^{51,52} @ 12mm 84 to 85 ⁵³ @ 10mm	0.8896 ^{51,52} 0.8847 ⁵³ @ 16°	1.4812 ^{51,52} 1.4787 ⁵³ @ 16°	

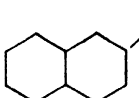
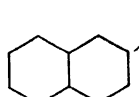
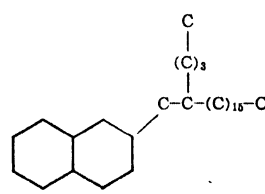
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<i>trans</i>-1,5-Dimethyl- [0,4,4]^(1,6)-bicyclo- decane		77 to 78 ⁸¹ @ 12mm 76 to 78 ⁵³ @ 10mm	0.8633 ⁸¹ 0.8544 ⁵³ @ 15°	1.4659 ⁸¹ 1.4658 ⁵³ @ 15°	
2,8-Dimethyl- [0,4,4]^(1,6)-bicyclo- decane		218 ¹⁰¹	0.880 ¹⁰¹ D_{20}^{20}		
					
3,8-Dimethyl- [0,4,4]^(1,6)-bicyclo- decane		216 to 217 ⁹ 208 ¹⁰¹	0.872 ¹⁰¹ D_{20}^{20}		
					

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,9-Dimethyl- [0,4,4]^(1,6)-bicyclo- decane 		216 to 218 ⁹	0.8518 ¹¹⁹		
C₁₂H₂₄ cis-1-Methyl-4- ethyl-[0,4,4]^(1,6)- bicyclodecane 	- 112 ⁷⁸	102 to 103 ⁸² @ 12mm 101 to 102 ⁸³ @ 12mm	0.8912 ⁸³ 0.8903 ⁸²	1.4819 ⁸² 1.4811 ⁸³	[α] _D ²⁰ = -0.85 ⁸³
trans-1-Methyl-4- ethyl-[0,4,4]^(1,6)- bicyclodecane		97 to 98 ⁸¹ @ 12mm	0.8630 ⁸¹	1.4665 ⁸¹	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
cis-1,5-Dimethyl-8-ethyl-[0,4,4]-^(1,6)-bicyclodecane 		115 to 116 ⁸² @ 12mm	0.8904 ⁸²	1.4815 ⁸²	
1,5-Dimethyl-8-ethyl-[0,4,4]-bicyclodecane		112 to 113 ⁸¹ @ 14mm	0.8703 ⁸¹	1.4727 ⁸¹	
1,5-Dimethyl-8-ethyl-[0,4,4]-^(1,6)-bicyclodecane (1,4(a)-Dimethyl-7-ethyldecalin)		120 to 125 ⁸ @ 20mm			
					

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20} °	n_D^{20}	Additional Data
2-Ethyl-3-propyl- [0,4,4]^(1,6)-bicyclo- decane 		79 to 89 ⁷² @ 2mm	0.8839 ⁷²	1.4778 ⁷²	
1,5-Dimethyl-8-iso- propyl-[0,4,4]^(1,6)- bicyclodecane 		126 to 128 ⁹³ @ 10.5mm 122 to 122.5 ⁹⁴ @ 7.5mm 116 to 117 ⁹⁴ @ 6.5mm	0.8896 ⁹⁴ 0.8893 ⁹⁴ 0.8881 ⁹³ 0.8911 ⁹⁶	1.48471 ⁹⁴ 1.483 ⁹⁴ 1.48278 ⁹⁴ 1.48259 ⁹³	$[\alpha]_D = +11.8^\circ$ ⁹⁴ $[\alpha]_D = +10.2^\circ$ ⁹⁴ $[\alpha]_D = +7^\circ$ ⁹⁰
2,8-Dimethyl-5-iso- propyl-[0,4,4]^(1,6)- bicyclodecane (Tetrahydrocadinene) 		125 to 128 ⁹⁰ @ 10mm	0.8838 ⁹⁰	1.4805 ⁹⁰	$[\alpha]_D = -20^\circ$ ⁹⁰

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,9-Dimethyl-5-isopropyl-[0,4,4]^(1,6)-bicyclodecane* (Tetrahydroisozingiberene) 		123 to 123.5 ⁹⁰ @ 10mm	0.8822 ⁹⁰	1.4791 ⁹⁰	$[\alpha]_D = -4.6^\circ$ ⁹⁰ *Correct structure of this seems to be 2,8-Dimethyl-5-isopropyl-[0,4,4] ^(1,6) -bicyclodecane. See Simonsen, "The Terpenes," p. 498. Cambridge Press, London (1932).
C₁₇H₃₂ 2-Propyl-3-butyl-[0,4,4]^(1,6)-bicyclodecane 		98 to 100 ⁷² @ 2mm	0.8796 ⁷²	1.4790 ⁷²	
C₂₀H₃₈ 2,2-Dimethyl-9-(1,5-dimethylhexyl)-[0,4,4]^(1,6)-bicyclodecane (Hexahydroiso-α-camphorene) 		180 to 186 ⁹² @ 14mm	0.8588 ⁹² @ 21°	1.46800 ⁹²	


Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Octadecyl-[0,4,4]^(1,6)-bicyclodecane 	43 to 47 ^{59,60}		0.863 ⁵⁹ @ 25° (extrap.)	1.4739 ⁵⁹ @ 25° (extrap.)	
C₃₂H₆₄ 3-Docosyl-[0,4,4]^(1,6)-bicyclodecane 			0.8673 ⁵⁹ @ 25°	1.4759 ⁵⁹ @ 25°	
3-(2-Butyloctadecyl)-[0,4,4]^(1,6)-bicyclodecane 		240 to 245 ⁶⁰ @ 3mm	0.8615 ⁵⁹ @ 25°	1.4772 ⁵⁹ @ 25°	

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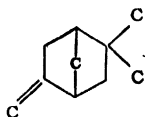
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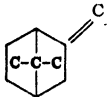
2. BICYCLANES WITH AN ALKENYL OR OLEFIN SUBSTITUTION, C₁₀H₁₆²¹⁻⁴

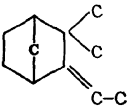
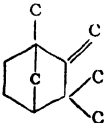
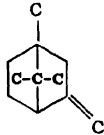
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
d-4-Methylene-1-isopropyl-[0,1,3]^(1,2)-bicyclohexane (Sabinene) 		163 to 165 ^{50,54,54} 162 to 166 ⁴⁸ 163 to 165 ⁴ @ 757.6mm 66 ³⁸ @ 30mm	0.8430 ³⁸ @ 30° 0.840 ^{48,54} 0.842 ^{50,54} 0.8422 ⁴ @ 17°	1.4660 ³⁸ @ 30° 1.465 ⁵⁰ 1.466 ⁴⁸ 1.4678 ⁵⁴ 1.46738 ⁴ @ 17° 1.46428 ⁴ n _{H_e} ¹⁷ 1.47514 ⁴ n _{H_β} ¹⁷ 1.48196 ⁴ n _{H_γ} ¹⁷	[α] _D = +63° ^{48,54} [α] _D = +80.17° ^{50,54} [α] _D = +80.07° ³⁸
l-4-Methylene-1-isopropyl-[0,1,3]^(1,2)-bicyclohexane		162 to 166 ¹ 161.5 to 163 ⁵⁰ @ 705mm	0.8407 ⁵⁰ D ₃₀ ³⁰ 0.8468 ¹	1.465 ⁵⁰ @ 30°	[α] _D = -46.19° ⁵⁰ [α] _D ¹⁵ = -42.5°

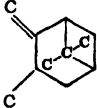
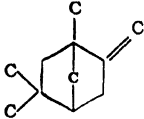
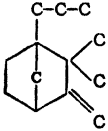
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Methylene-2,2-dimethyl-[1,2,2]^(1,4)-bicycloheptane (Continued)					
<i>dl</i> -Camphene	41 to 42 ²	160 to 161 ⁵⁴	0.8223 ¹³	1.44115 ¹³	
	44.5 to	160 ¹⁸	@ 78°	n _{H_a} ⁷⁸	
	46 ⁵⁸	159.5 to	0.8524 ³⁸	1.45061 ¹³	
	45 to	160 ^{2,19}	D ₆₀ ⁶⁰	n _{H_B} ⁷⁵	
	46 ³⁰	159 to 160 ⁵	0.8544 ³⁸	1.45614 ¹³	
	46 to	158 to	D ₆₅ ⁵⁵	n _{H_γ} ⁷⁸	
	47 ²	160 ^{30,58}	0.8565 ³⁸		
	48 to	158 to 159 ^{2,16}	D ₅₀ ⁵⁰		
	49 ^{2,16}	157 to 157.5 ³⁸	0.8586 ³⁸		
	49 ¹⁹	@ 750mm	D ₄₅ ⁴⁵		
	49 to 51 ²	156.3 to	0.8609 ³⁸		
	49.5 to	156.7 ³¹	D ₄₀ ⁴⁰		
	50.5 ²	@ 712mm			
	50 ^{5,31,54}	51 to 53 ³⁷			
	54 ¹⁸	@ 17mm			
<i>d</i>-5-Methylene-2,2-dimethyl-[1,2,2]^(1,4)-bicycloheptane (β-Fenchene)					
		151 to 153 ²⁸	0.8591 ³⁹	1.4645 ³⁹	α] _D = +62.91° ³⁹
		150.5 to	0.8599 ³⁹	@ 23°	α] _D = +62.5° ³⁹
		153.5 ³⁹		1.4654 ³⁹	
		150 to 153 ³⁹		@ 18.6°	

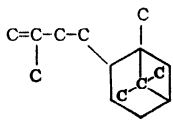
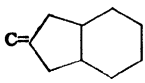
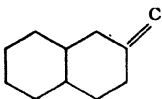


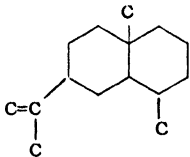
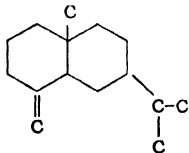
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
5-Methylene-2,2-dimethyl-[1,2,2]-(1,4)-bicycloheptane		151 to 153 ^{23, 27, 28} 152 to 153 ²⁴	0.8581 ²³ 0.8596 ²⁷ 0.8597 ²⁴ 0.8598 ²⁸ @ 17°	1.4644 ²³ 1.46511 ²⁴ 1.4658 ²⁷ 1.4662 ²⁸ @ 17°	
l-4-Methylene-7,7-dimethyl-[1,1,3]-(1,3)-bicycloheptane					$[\alpha]_D^{22} = -17.19^\circ$ ⁴⁷ $[\alpha]_D = -22.48^\circ$ ¹¹
(Nopinene, β -Pinene)	About - 50 ⁵⁷	165.2 ¹¹ 164 to 166 ⁴⁷ 164 ⁵⁷ 163 to 165 ⁵⁴ 162 to 164 ⁴⁶ 162 to 163 ⁵⁷ 160 ⁵¹ 156 to 157 ⁵¹ 164 to 166 ¹⁴ @ 758mm 163.5 to 165.5 ⁷⁰ @ 742mm	0.866 ⁵⁷ @ 22° 0.869 ^{46, 54} 0.8708 ¹¹ 0.8650 ¹⁴ @ 15° 0.8720 ⁴⁷ @ 15° 0.8740 ¹² @ 15° 0.875 ⁸ @ 15° 0.8758 ⁵¹ D_0^0	1.4647 ⁵¹ @ 22° 1.4724 ⁵⁷ @ 22° 1.4766 ⁷⁰ @ 20.5° 1.47548 ¹⁴ 1.4812 ¹¹ 1.478 ⁸ @ 15° 1.4872 ¹² @ 15°	$[\alpha]_D = -22.33^\circ$ ⁵⁷ $[\alpha]_D = -22.1^\circ$ ⁸ $[\alpha]_D = -19.19^\circ$ ¹⁴ $[\alpha]_D = -17.8^\circ$ ^{46, 54} $[\alpha]_D = -16.24^\circ$ ⁵¹

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methylene-7,7-dimethyl-[1,2,2]^(1,4)-bicycloheptane <i>(l-α-Fenchene)</i> 		159 to 162 ⁶⁴ 157 to 159 ³⁹ 156 to 157 ⁶⁹ 155 to 160 ²⁵ 155 to 158 ²⁹ 154 to 156 ⁶³ 153 to 155.5 ³⁹ 152 to 157 ³³ @ 750mm 153 to 154 ⁴⁴ @ 720mm	0.8616 ³³ 0.865 ⁶⁴ 0.8664 ³⁹ 0.8675 ³⁹ 0.8677 ²⁹ 0.869 ⁶⁹ @ 19° 0.866 to 0.867 ⁶³ @ 18° 0.8670 ²⁵ @ 17.5° 0.870 ⁴⁴ @ 13°	1.47092 ³⁹ @ 23.2° 1.46876 ³⁹ @ 22.3° 1.4642 ³³ 1.47085 ³⁹ @ 19.5° 1.4724 ⁶⁹ @ 19° 1.4693 ⁶³ @ 18° 1.46729 ²⁵ @ 17.5° 1.4750 ⁴⁴ @ 13°	[α] _D = -32.3° ²⁵ [α] _D ^{19.5} = -32.76° ³⁹ [α] _D ¹⁸ = -32.12° ⁶⁹ [α] _D = -4.4° ⁶⁴ [α] _D = -38° ⁴⁴ [α] _D = -39.50° ²⁹
2-Methylene-7,7-dimethyl-[1,2,2]^(1,4)-bicycloheptane <i>(d-α-Fenchene)</i>		155 to 161 ⁶⁶ 140.5 to 142.5 ³⁹ @ 755mm	0.8630 ⁶⁶	1.4699 ⁶⁶	[α] _D ²⁰ = +12.76° ⁶⁶
2-Methylene-7,7-dimethyl-[1,2,2]^(1,4)-bicycloheptane <i>(dl-α-Fenchene)</i>		158 to 160 ⁶² 154 to 156 ²² 155 to 157 ²²	0.8660 ²² 0.8656 ²² 0.864 ⁶²	1.47045 ²² 1.4708 ²² 1.46900 ⁶²	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,2-Dimethyl-3-ethylidene-[1,2,2]^(1,4)-bicycloheptane (ω-Methylcamphene) 		178 ³⁰ 172 to 173 ⁷¹ @ 743mm	0.8638 ⁷¹ @ 27° 0.884 to 0.888 ³⁰ @ 15°	1.4643 ⁷¹ @ 27°	[α] _D = +4.28° ³⁰
2-Methylene-1,3,3-trimethyl-[1,2,2]^(1,4)-bicycloheptane (α-Methylcamphene) 		170.5 to 171 ³⁴ @ 764mm			
3-Methylene-1,7,7-trimethyl-[1,2,2]^(1,4)-bicycloheptane (Methylenecamphane) 	28 ⁶⁵	166 to 168 ⁶⁶ 58 to 62 ⁴² @ 11mm			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
6-Methylene-5,7,7-trimethyl-[1,1,3]-bicycloheptane (Methylpinene) 		161 to 164 ¹⁷ @ 783mm	0.8363 ¹⁷	1.46362 ¹⁷	$[\alpha]_D^{20} = +0.2420^\circ$ ¹⁷
2-Methylene-1,5,5-trimethyl-[1,2,2]-bicycloheptane (dl-Methyl-β-fenchene) 		160 to 162 ²²	0.85205 ²²	1.46261 ²² @ 20.5°	
C₁₃H₂₂ 3-Methylene-2,2-dimethyl-1-propyl-[1,2,2]-bicycloheptane (β-Propylcamphene) 		92 to 93 ³⁵ @ 16mm 86 to 87 ³⁵ @ 12mm	0.87188 ³⁵ 0.8722 ³⁵	1.4786 ³⁵ 1.4770 ³⁵	$[\alpha]_D = -36.71^\circ$ ³⁵

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
1,7,7-Trimethyl-6-(3-methylbuten-3-yl)-[1,1,3]^(1,3)-bicycloheptane (γ-Dihydrocaryophyllene) <div>  </div>		126 ¹⁰ @ 15mm 124 to 124.5 ⁹ @ 12.75mm 131 ⁵⁰ @ 11mm	0.8872 ⁹ @ 21° 0.8893 ¹⁰ @ 18° 0.8965 ⁵⁰ @ 15°	1.4880 ⁹ @ 21° 1.4885 ¹⁰ @ 18° 1.496 ⁵⁰ @ 18°	$[\alpha]_D = -29.41^\circ$ ⁹ $[\alpha]_D = -4.97^\circ$ ⁵⁰
C₁₀H₁₆ <i>trans</i>-8-Methylene-[0,3,4]-bicyclononane (<i>trans</i> -2-Methylenehexahydrohydrindene) <div>  </div>		59 to 60 ⁵² @ 9.5mm	0.8663 ⁵²	1.4720 ⁵²	
C₁₁H₁₈ <i>trans</i>-3-Methylene-[0,4,4]-bicyclodecane (<i>trans</i> -2-Methylenedecalin) <div>  </div>		82 to 82.5 ⁵² @ 10mm 81 to 83 ⁵⁵ @ 9mm	0.8897 ⁴⁶ 0.8928 ⁵⁵ @ 16°	1.4870 ^{52,55}	

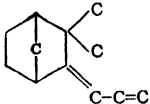
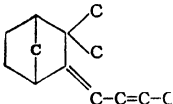
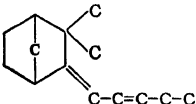
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,5-Dimethyl-8-isopropenyl-[0,4,4]-bicyclodecane (Dihydroeudesmene) <div>  </div>		132 to 133 ⁴⁵ @ 15mm 127 ⁴³ @ 12mm 126 to 127 ⁴⁵ @ 12mm 126 to 130 ⁴⁹ @ 10mm	0.9067 ⁴⁹ 0.9075 ⁴⁵ 0.9080 ⁴⁵	1.4876 ⁴⁹ 1.4972 ⁴⁵ 1.5043 ⁴⁵	[α] = -7° ⁴⁹
7-Methylene-1-methyl-4-isopropyl-[0,4,4]-bicyclodecane (Dihydroselinene) <div>  </div>		138 to 139 ⁴⁵ @ 12mm	0.8992 ⁴⁵ @ 24°	1.4878 ⁴⁵ @ 24°	

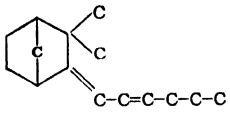
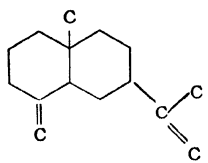
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3. BICYCLANES WITH TWO ALKENYL OR ONE ALKADIENYL SUBSTITUTION, C_nH_{2n-6}

 $C_{18}H_{18}$

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
2,2-Dimethyl-3-propen-2-ylidene-[1,2,2]-(1,4)-bicycloheptane (ω -Vinylcamphene) <div style="text-align: center;">  </div>		203 to 205 ° 85 to 90 ° @ 10mm	0.917 ° 0.921 ° @ 15°		$[\alpha]_D = +76.39^\circ$
$C_{18}H_{20}$ 2,2-Dimethyl-3-buten-2-ylidene-[1,2,2]-(1,4)-bicycloheptane (ω -Propenylcamphene) <div style="text-align: center;">  </div>		230 to 232 ° 95 to 97 ° @ 12mm	0.919 ° @ 15°		$[\alpha]_D = +70^\circ$
$C_{14}H_{22}$ 2,2-Dimethyl-3-penten-2-ylidene-[1,2,2]-(1,4)-bicycloheptane (ω -Butenylcamphene) <div style="text-align: center;">  </div>		238 to 240 ° 110 to 120 ° @ 15mm	0.905 ° @ 15°		$[\alpha]_D = +80^\circ$

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
2,2-Dimethyl-3-hexen-2-ylidene-[1,2,2]-(1,4)-bicycloheptane (ω-Pentenylcamphene) 		255 ¹ 140 @ 10mm ¹	0.900 ¹ @ 15°		$[\alpha]_D = +73.5^\circ$ ¹
1-Methyl-7-methylene-4-isopropenyl-[0,4,4]-(1,6)-bicyclodecane (β-Selinene) 		268 to 272 ⁴ 142 to 144 ³ @ 20mm 136 to 139 ⁵ @ 17mm 135 ² @ 16mm	0.9107 ⁵ 0.9140 ² 0.9196 ⁴ 0.9232 ⁴ @ 15° 0.9279 ³ @ 15°	1.50311 ⁵ 1.5042 ² 1.5102 ³ @ 15°	$[\alpha]_D = +34^\circ$ ² $[\alpha]_D = +31.36^\circ$ ⁵ $[\alpha]_D = +49.5^\circ$ ⁴ $[\alpha]_D = +63^\circ$ ³

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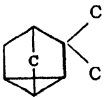
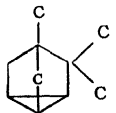
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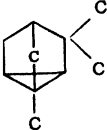
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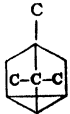
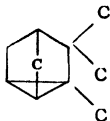
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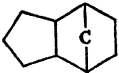
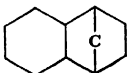
VI. TRICYCLANES, (ENDOCYCLIC), C_nH_{2n-4}

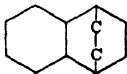
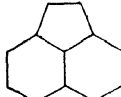
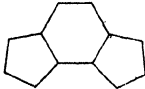
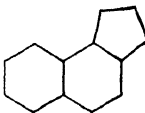
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
2,2-Dimethyl-1,4-endo-methylene-[0,1,3]^(3,5)-bicyclohexane (Apocyclene) 	36.5 to 37.5 ²⁸ 38.5 to 39.5 ²⁷ 39 to 40 ³⁹ 41 to 42 ²⁸ 42.5 to 43 ³¹	138 to 139 ³¹ @ 764mm 138 to 139.5 ²⁸ @ 763.7mm 138 to 139 ²⁷ @ 762mm 137.5 ²⁸ @ 756mm 136.5 to 137 ³⁹ @ 748mm	0.8710 ³¹ @ 40° 0.8717 ²⁷ @ 40° 0.8734 ²⁸ @ 40°	1.45144 ³¹ @ 40° 1.45204 ²⁷ @ 40° 1.45434 ² @ 40° 1.44910 ³¹ $n_{H_a}^{40}$ 1.45686 ³¹ $n_{H_\beta}^{40}$ 1.46190 ³¹ $n_{H_\gamma}^{40}$	
C₁₀H₁₆ 1,2,2-Trimethyl-1,4-endomethylene-[0,1,3]^(3,5)-bicyclohexane 	116 to 117 ³⁰	150 to 151 ³⁰			

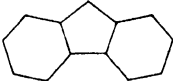
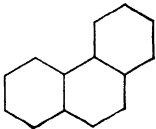
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
2,2,4-Trimethyl-1,4-endomethylene- [0,1,3]^(3,5)-bicyclohexane (Cyclofenchene) <div style="text-align: center;">  </div>			0.859₈		$[\alpha]_D^{20} = +3.54^\circ$ ⁵⁰ $[\alpha]_D^{20} = -1.77^\circ$ ⁴⁴ $[\alpha]_D^{19} = +0.8^\circ$ ⁵⁰ $[\alpha]_D^{18} = -0.28^\circ$ ⁵⁰ $[\alpha]_D = +0.28^\circ$ ²
	143 to 143.7 ⁵⁰ @ 777mm	0.8589 ⁴⁵ @ 20.4°	1.4503 ⁵⁰ @ 22°		
	144 ⁴⁶ @ 770mm	0.8574 ²⁹ 0.8584 ⁵⁰	1.45212 ⁵⁰ @ 20.4°		
	144 to 146 ⁴	0.8587 ⁵⁰	1.45442 ⁵⁰ @ 20.2°		
	142.8 to 147 ⁵⁰	0.8588 ³²	1.44769 ²		
	141.5 to 143.5 ²	0.8591 ⁵⁰ 0.8599 ³	1.45133 ⁴⁵		
	140 to 143 ²⁹	0.8603 ⁴⁰	1.4515 ⁴⁰		
	143 to 144 ³² @ 756mm	0.8604 ⁶² 0.8609 ⁴⁴	1.4525 ⁶² 1.4532 ⁴⁴		
	141.5 to 142 ⁵⁰ @ 755mm	0.8636 ³⁸	1.45327 ²⁹		
	143 to 143.5 ^{40,41} @ 754mm	0.8624 ^{16,32} @ 16.5° 0.8624 ⁴⁶ @ 16.4°	1.45768 ³ 1.4579 ³⁸ 1.45364 ^{16,32} @ 16.5°		
	142 to 143 ^{16,32} @ 752mm	0.8624 ³² @ 16°	1.45370 ⁴⁵ @ 16.2°		
	143.6 to 143.9 ⁴⁵ @ 750mm		1.45474 ³² @ 16°		
	143 ⁶² @ 749.5mm		1.4547 ³² @ 16°		
	143 to 143.5 ⁴⁶ @ 748mm		1.45104 ⁴⁶ $n_{H_a}^{16,2}$		
	143 to 143.5 ⁴⁴ @ 747.5mm		1.45231 ³² $n_{H_a}^{16}$		
	145 to 149 ³⁸ @ 747mm		1.45968 ⁴⁵ $n_{H_\beta}^{16,2}$		
			1.46067 ³² $n_{H_\beta}^{16}$		
			1.46449 ⁴⁶ $n_{H_\gamma}^{16,2}$		
			1.46547 ³² $n_{H_\gamma}^{16}$		

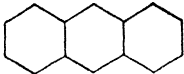
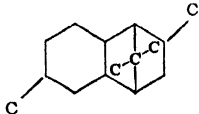
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-1,4-(di-methylendomethylene)-[0,1,3]^(3,5)-bicyclohexane					
(Isocyclene)	117.5 ¹⁸	150 to 151 ⁴³	0.7948 ^{18,46}	1.40996 ¹⁸	
(β-Bornylene)	117 to 118 ⁷ 119 ^{40,43}	150 to 152 ⁷ 151 ⁴⁰ 150 to 151 ⁴⁰ 150 to 151 ⁶⁸ @ 743mm	@ 120.8°	n _{H_a} ^{20,8} 1.41743 ¹⁸ n _{H_β} ^{20,8} 1.42195 ¹⁸ n _{H_γ} ^{20,8}	
					
2,2,3-Trimethyl-1,4-endomethylene-[0,1,3]^(3,5)-bicyclohexane					
(Tricyclene)	64 to	153 ⁴⁶	0.8268 ¹⁸	1.43890 ³⁶	
(Cyclene)	65 ²⁹	@ 761mm	@ 80 2°	@ 70°	
	64.3 ³⁶	153.5 ^{36,37}	0.8373 ^{36,37}	1.44055 ⁴⁶	
	64.5 to	153 to	@ 70°	@ 66.9°	
	65 ⁶⁷	153.5 ⁶⁷	0.8440 ⁴⁶	1.42963 ¹⁸	
	65.3 ^{36,37}	152.3	@ 66.0°	n _{H_a} ^{60,2}	
	65.5 to	to 153.3 ³⁶		1.43816 ⁴⁶	
	66 ⁴¹	152 to 152.5 ⁵⁹		n _{H_a} ^{66,9}	
	66.5 ¹⁷	152.8 to 153 ⁶⁰		1.43744 ¹⁸	
	66.5 to	@ 757.5mm		n _{H_β} ^{60,2}	
	67 ⁵⁹	152.5 ^{17,46}		1.44644 ⁴⁶	
	67 to	@ 747mm		n _{H_β} ^{66,9}	
	68 ¹³	152		1.44206 ¹⁸	
	67.5 to	@ 740 mm		n _{H_γ} ^{60,2}	
	67.8 ⁶⁰				
					

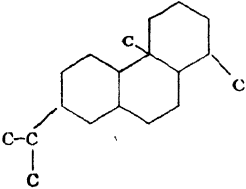
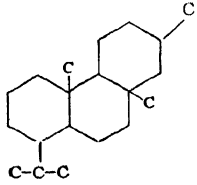
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2,2,3-Tetramethyl- 1,4-endomethylene- [0,1,3]^(3,5)-bicyclohexane (4-Methyltricyclene) <div> </div>	109 to 110 ³⁰ 113 to 114 ⁴²	163.5 to 164.5 ³⁰			
2,2,3,4-Tetramethyl- 1,4-endomethylene- [0,1,3]^(3,5)-bicyclohexane <div> </div>	71 to 73 ⁸	172 to 175 ⁸			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,5-Endomethylene- [0,3,4]-bicyclononane (low melting isomer) 	9 ¹⁶	191.5 ¹⁶ @ 769mm	0.9121 ¹⁶ @ 80° 0.9027 ¹⁷ @ 79.2° 0.9492 ¹⁷ @ 20.8°	1.46705 ¹⁷ n _{H^a} ^{79.2} 1.49308 ¹⁷ n _{H^a} ^{20.8} 1.47538 ¹⁷ n _{H^β} ^{79.2} 1.50184 ¹⁷ n _{H^β} ^{20.8} 1.48021 ¹⁷ n _{H^γ} ^{79.2} 1.50706 ¹⁷ n _{H^γ} ^{20.8}	
(high melting isomer)	79 ^{16,56}	193 ¹⁶ @ 769mm 123 ¹⁶ @ 100mm 118 ¹⁶ @ 85mm 101 ¹⁶ @ 48mm 86 ¹⁶ @ 24mm	0.9120 ¹⁶ @ 80° 0.9128 ¹⁷ @ 79°	1.47258 ¹⁷ n _{H^a} ⁷⁹ 1.48101 ¹⁷ n _{H^β} ⁷⁹ 1.48592 ¹⁷ n _{H^γ} ⁷⁹	
C₁₁H₁₈ 2,5-Endomethylene- [0,4,4]-bicyclodecane (1,4-Endomethylene decalin) 		91 @ 22mm ¹⁸ 84 to 85 ¹⁸ @ 15mm			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,5-Endoethylene- [0,4,4]-bicyclodecane 			0.9675 ⁶ @ 22°	1.5042 ⁶ @ 22° 1.5015 ⁶ n _D ²² _a	
Decahydroacenaph- thene 		235 to 237 ²⁵ 235 to 236 ³⁴ 235 ²¹ 230 to 234 ²³	0.9488 ²⁶ @ 25° 0.9370 ²³ @ 0°	1.4996 ²⁶ @ 25°	
4,5-Cyclopentano- [0,3,4]-bicyclononane 		106 to 108 ⁴⁷ @ 18mm	0.9145 ⁴⁷	1.4840 ⁴⁷	
C₁₃H₂₂ 2,3-Cyclopentano- [0,4,4]-bicyclodecane (1,2-Cyclopentano- decahydronaphthalene) 		71 to 72 ⁴⁸ @ 2.5mm	0.9241 ⁴⁸	1.4895 ⁴⁸	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
7,8-Cyclohexano- [0,3,4]-bicyclononane (Dodecahydrofluorene) 		254 to 258 ²³	0.9496 ²³ @ 0°		
C₁₄H₂₄ 2,3-Cyclohexano- [0,4,4]-bicyclodecane (Perhydrophenanthrene) 	- 3 ³⁴	270 to 275 ³⁴ 275 to 276 ¹¹ @ 754.3mm 274 to 277 ⁵¹ @ 739mm 156 ¹⁵ @ 26mm 147 to 149 ¹⁴ @ 20mm 150 to 160 ²⁵ @ 18mm 142 to 144 ¹⁴ @ 15mm 135 ¹⁵ @ 13mm 131 ¹⁵ @ 10mm 93 to 96 ⁴⁸ @ 2.5mm 90 to 93 ⁴⁸ @ 2.5mm 86 to 89 ⁴⁸ @ 2mm	0.9630 ²⁵ @ 25° 0.9609 ²⁵ @ 25° 0.9385 ⁴⁸ @ 25° 0.9437 ⁴⁸ @ 25° 0.9447 ⁴⁸ 0.933 ³⁴ D ₂₀ ²⁰ 0.9503 ¹¹ @ 16°	1.5003 ¹⁸ @ 25° 1.5261 ³⁴ @ 25° 1.5323 ³⁴ @ 25° 1.4994 ⁴⁸ 1.5011 ⁴⁸ 1.5019 ⁴⁸ 1.5035 ¹⁴ @ 16° 1.5050 ¹⁴ @ 16° 1.5060 ¹¹ @ 16°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,4-Cyclohexano- [0,4,4]-bicyclodecane (Perhydroanthracene) 	60.5 to 61 ²⁸ 61 to 62 ¹⁰ 88 to 89 ²⁴ 88 ^{19,20,26,28} 90 to 90.5 ²⁷ 93 ²²	272 to 277 ²⁴ 270 ²⁰ ca. 270 ³⁵ 150 to 155 ²⁵ @ 13mm 128 ²³ @ 11mm	0.9747 ²⁵ @ 25°	1.5275 ²⁵ @ 25°	
C₁₅H₂₆ 3,8-Dimethyl-2,5-(di- methylenedimethylene)- [0,4,4]-bicyclodecane (Dihydrocedrene) 		118 to 124 ¹⁸ @ 12mm 122 to 123 ⁵⁴ @ 10mm 116 to 122 ⁵² @ 10mm 109 to 112 ¹² @ 10mm 119 to 120 ⁵³ @ 8mm	0.9041 ¹² 0.907 ¹² 0.9204 ⁵⁴ 0.9247 ⁴² 0.9052 ⁵³ @ 15°	1.48719 ¹² 1.48721 ⁵² 1.4882 ¹² 1.49204 ⁵³ 1.4929 ⁵⁴	[α] _D ²⁰ = +2° ⁵⁴ [α] _D = +33.10° ¹²

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-8-isopropyl- 2,3-(4-methylcyclo- hexano)-[0,4,4]-bicyclo decane (Fichtelite)	46 ^{9,23} 46.5 ^{1,61} 48 ⁵⁸	355 ²³ 355.2 ⁵ @ 719mm 235.6 ⁵ @ 43mm 233.6 ⁵ @ 42mm			[α] _D = +18.08° ⁴⁹ [α] _D = +19.00° ⁵¹
					
C₂₀H₃₆ 1,3-Dimethyl-7-iso- propyl-2,3-(3-methyl- cyclohexano)-[0,4,4]- bicyclodecane (Tetrahydrosciadopitene)		175 to 176 ⁵⁸ @ 6mm 170 to 171 ⁵⁸ @ 5mm	0.9751 ⁵⁸ @ 15° 0.9761 ⁵⁸ D ₁₁ ¹⁵	1.5278 ⁵⁸	[α] _D ¹⁵ = +10.59° ⁵⁸
					

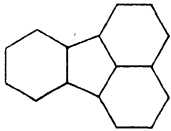
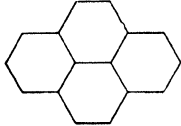
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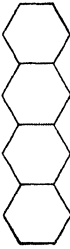
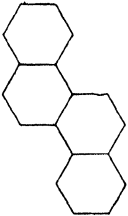
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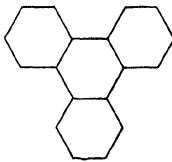
VII. POLYCYCLANES OR POLYCYCLOPARAFFINS

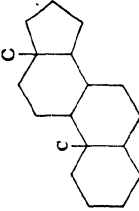
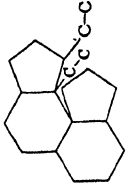
1. Polycyclanes with alkyl substitutions, C_nH_{2n-6}
2. Polycyclanes with an alkenyl or olefin substitution, C_nH_{2n-8}

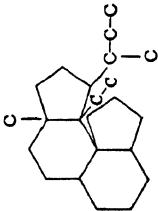
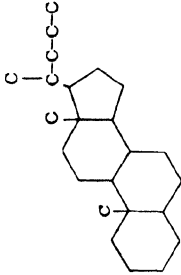
1. POLYCYCLANES OR POLYCYCLOPARAFFINS WITH ALKYL
 SUBSTITUTIONS, C_nH_{2n-6}
 $C_{18}H_{26}$

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Perhydrofluoranthene 		168 to 170 ° @ 12mm	0.9811 ° @ 22°		
Perhydropyrene 	87.8 °	162 to 166 ° @ 9.5mm	0.9828 ° @ 25°	1.5228 ° @ 25°	

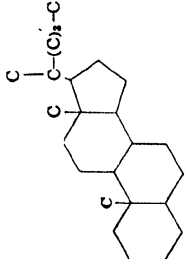
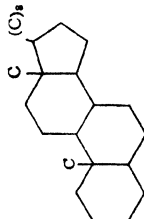
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>Perhydronaphthacene</p> <p>(3,4,8,9-Dicyclohexano-[0,4,4]-bicyclododecane)</p> 	ca. 50 ¹				
<p>Perhydrochrysene</p> <p>(4,5,9,10-Dicyclohexano-[0,4,4]-bicyclododecane)</p> 	< -20 ¹⁰ 115 ¹⁰	359 to 360 ¹⁰ @ 771mm 353 ¹⁰	0.9827 ¹⁰	1.52412 ¹⁰ @ 17°	

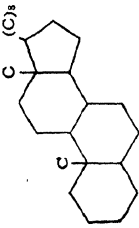
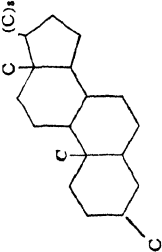
<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
Perhydrotriphenylene (Perhydro-9,10-benzophenanthrene) (2,3,4,5)-Dicyclohexano-[0,4,1]-bicyclodecane from lignin <div style="text-align: center;">  </div>		200 to 208 ¹⁴ @ 17mm	0.9512 ¹⁴ @ 19.2°	1.50776 ¹⁴ <i>n_{H_e}²⁰</i> 1.50510 ¹⁴ <i>n_{H_a}²⁰</i> 1.51493 ¹⁴ <i>n_{H_β}²⁰</i> 1.52080 ¹⁴ <i>n_{H_γ}²⁰</i>	
from synthesis		200 to 201.5 ¹⁴ @ 20mm 175 to 176 ¹⁶ @ 7mm	0.9425 ¹⁵ 0.9468 ¹⁴ @ 19.2°	1.50693 ¹⁴ <i>n_{H_e}²⁰</i> 1.50432 ¹⁴ <i>n_{H_a}²⁰</i> 1.51382 ¹⁴ <i>n_{H_β}²⁰</i> 1.51959 ¹⁴ <i>n_{H_γ}²⁰</i>	

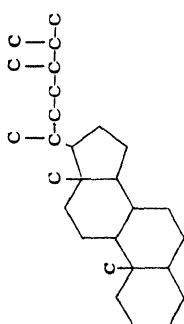
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 160mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Androstane 	49 to 50 ⁴ 49 to 51 ¹²				
Pregnane* 	83.5 ³		1.0319 ³ @ 15°	1.556 ³	$[\alpha]_D = +19.9^\circ$ *Melting point was determined on one preparation. Remaining constants were determined on another preparation.

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<p>Norcholane †</p> 	101 to 103 ²¹				†The following structures are given by ref. (8) and (22) for these compounds.
<p>Cholane</p> 	90 ²⁰				

 $C_{24}H_{42}$

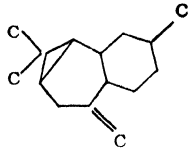
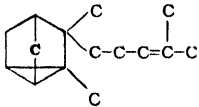
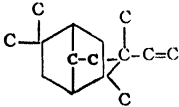
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Homocholane 	75 ²⁰				Tentative structure as given by F. C. Whitmore, "Organic Chemistry," Van Nostrand Co., Inc., New York, 1937.
Cholestane 	81 ¹⁶ 80 ²² 78 to 79 ¹⁷ 71 ¹⁸	269 to 271 ¹¹ @ 12mm			
C₂₇H₄₈					
					$[\alpha]_D^{20} = +22.5^\circ$ ¹⁷ $[\alpha]_D = +25.46^\circ$ ¹⁸ $[\alpha]_D^{15} = +43.32^\circ$ ¹¹

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 160mm	D_4^{20}	n_D^{20}	Additional Data
Pseudocholestane 	70 to 71 ¹⁹ 69 ²²				
3-Methylcholestane 	96 to 97 ⁷				

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>Ergostane</p> 	<p>101 to 102 ¹³ 82 ⁸ 81 to 82 ⁸</p>				<p>$[\alpha]_D^{18} = +22.9^\circ$</p>

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2. POLYCYCLANES WITH AN ALKENYL OR OLEFIN
 SUBSTITUTION, C_nH_{2n-6}
 $C_{15}H_{24}$

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Ledene 		255 ° 264 ° @ 752mm 139 to 142 ° @ 10mm	0.9233 ° 0.9237 ° @ 19° 0.9349 ° @ 0°	1.50273 ° 1.5050 °	
α-Santalene 		253 to 254 ° 252 ° @ 753mm 118 ° @ 7mm	0.9132 ° @ 15° 0.9134 ° @ 0°	1.49205 ° @ 15°	
Longifolene 		254 to 256 ° @ 706mm 150 to 151 ° @ 36mm	0.9284 ° D_{30}^{20}	1.495 ° @ 30°	$[\alpha]_D = +42.73^\circ$



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VIII. CYCLENES OR CYCLOÖLEFINS


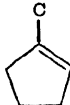
1. Cyclenes with alkyl substitutions, C_nH_{2n-2}
2. Cyclenes with an alkenyl or olefin substitution, C_nH_{2n-4}
3. Cyclenes with two alkenyl or one alkadienyl substitution, C_nH_{2n-6}
4. Cyclenes with an alkene-alkyne or an alkatriene substitution, C_nH_{2n-8}

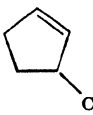
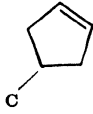
1. CYCLENES WITH ALKYL SUBSTITUTIONS, C_nH_{2n-2}

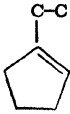
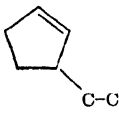
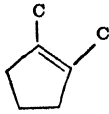
C.H.

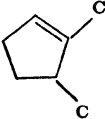
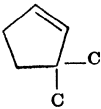
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclobutene 		1.5 to 2.4 @ 729mm	0.733 ⁴ @ 0°		
C₅H₈ 1-Methylcyclobutene-1 		37 to 39 ^{2,3} 37 to 38 ¹ @ 750mm	0.7075 ¹ @ 23°	1.4034 ² @ 23°	

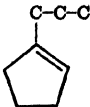
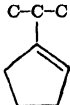
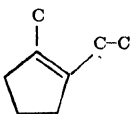
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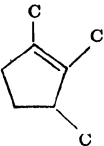
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
Cyclopentene 		44.4 44 to 45 ³⁷ @ 763mm 44.3 ⁶¹ @ 761mm 45 to 46 ^{44,63} 45 ^{24,25} 44.02 ¹¹ 43.6 to 43.8 ² 44.1 to 44.6 ⁵⁰ @ 752mm 43 to 44.2 ²³ @ 751mm	0.772₁ 0.7716 ¹¹ 0.7736 ⁶¹ 0.776 ² 0.7743 ⁵⁰ @ 18° 0.7753 ⁶¹ @ 17.9° 0.7756 ⁶¹ @ 17.2° 0.7754 ⁸¹ @ 14° 0.7783 ^{26,27} $D_{13.5}^{13.5}$ 0.7776 ²³ @ 10° 0.7861 ² @ 7.1° 0.7864 ² @ 6.75°	1.422₁ 1.42246 ⁶¹ 1.4247 ² 1.4420 ¹¹ 1.42183 ⁵⁰ @ 18° 1.42080 ³¹ @ 14° 1.4256 ^{26,27} @ 13.5° 1.4287 ²³ @ 10° 1.43052 ² @ 7.1° 1.42818 ² $n_{H_a}^{7.1}$ 1.43746 ² $n_{H_\beta}^{7.1}$ 1.44306 ² $n_{H_\gamma}^{7.1}$	$\frac{dD}{dt} = -0.0009_8/^\circ\text{C.}$ (5° to 20°) $\frac{dn}{dt} = -0.0005_4/^\circ\text{C.}$ (5° to 20°)
C₆H₁₀ 1-Methyl- cyclopentene-1 	-127.2 ¹⁶	75.1 75.5 to 76 ¹⁶ 75 to 76 ¹³ 72 to 75 ⁴⁵ 72 ^{41,42} @ 754mm 71 ²⁶ @ 743mm	0.778₀ 0.7754 ⁴⁵ D_{20}^{23} 0.7474 ²⁶ @ 21° 0.7758 ⁴² D_0^{20} 0.7918 ^{26,27} $D_{13.5}^{13.5}$ 0.7979 ¹⁶ @ 0° 0.7879 ⁴² D_0^0	1.4347 ¹⁶ @ 15° 1.4309 ^{26,27} @ 13.5° 1.4319 ¹⁶ $n_{H_o}^{15}$ 1.4416 ¹⁶ $n_{H_\beta}^{15}$ 1.4512 ¹⁶ $n_{H_\gamma}^{15}$	$\frac{dD}{dt} = -0.0009_8/^\circ\text{C.}$ (0° to 25°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
d-3-Methyl- cyclopentene-1 		66.5 to 67 ²⁸ @ 766mm 69 ⁶⁹ @ 765mm 69 to 71 ⁴¹	0.7663 ⁶⁹ @ 18° 0.772 ²⁸ @ 16°	1.4222 ⁶⁹ @ 18° 1.4250 ²⁸ @ 16°	$[\alpha]_D = +59.07^\circ$ ⁶⁹ $[\alpha]_{579} = +77.90^\circ$ ²⁸
dl-3-Methyl- cyclopentene-1		72 ⁶¹ @ 772mm 66.5 to 67 ²⁸ @ 766mm 69 to 71 ⁶⁵	0.7851 ⁶⁵ 0.7705 ⁶¹ @ 20.0° 0.7715 ⁶¹ @ 18.9° 0.769 ²⁸ @ 16°	1.42476 ⁶¹ 1.4201 ⁶⁵ 1.4233 ²⁸ @ 16° 1.42214 ⁶¹ $n_{H_a}^{20}$ 1.43120 ⁶¹ $n_{H_\beta}^{20}$ 1.43573 ⁶¹ $n_{H_\gamma}^{20}$	
4-Methyl- cyclopentene-1 		75 to 76 ²⁸ @ 766mm	0.784 ²⁸ @ 16°	1.4346 ²⁸ @ 16°	

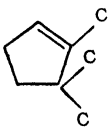
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Ethylcyclopentene-1 	-123.3 ¹⁸	108 109 ³³ 107 to 110 ⁶⁷ 106.5 to 107 ¹⁵	0.8000 ¹⁵ 0.792 ³³ 0.7975 ⁶⁷ 0.8041 ¹⁵ @ 15°	1.4429 ¹⁵ @ 21.4° 1.4424 ³³ 1.4426 ⁶⁷ 1.4402 ¹⁵ n _{H_a} ^{21,5} 1.4497 ¹⁵ n _{H_β} ^{21,5}	
3-Ethylcyclopentene-1 		99 to 103 ⁹ @ 758mm	0.7874 ⁹	1.43030 ⁹	
1,2-Dimethylcyclopentene-1 	-90.4 ¹⁴ -91.3 ²⁰	105.03 ²⁰ 105 to 105.2 ¹⁴ 103 ³⁴ 103 to 103.5 ³⁵ @ 757mm	0.795₁ 0.78612 ²⁰ @ 30° 0.79501 ²⁰ 0.7952 ¹⁴ 0.7923 ^{34,35} D ₀ ²⁰ 0.7998 ¹⁴ @ 15° 0.79948 ²⁰ @ 15° 0.7992 ³⁵ D ₀ ^{13,5} 0.81283 ²⁰ @ 0°	1.4447 ^{34,35} @ 13.5° 1.4412 ¹⁴ n _{H_a} ²⁰ 1.44139 ²⁰ n _{H_a} ²⁰ 1.45115 ¹⁴ n _{H_a} ²⁰ 1.45142 ³⁰ n _{H_β} ²⁰ 1.4571 ¹⁴ n _{H_γ} ²⁰ 1.45717 ²⁰ n _{H_γ} ²⁰	$\frac{dD}{dt} = -0.0009/^\circ\text{C.}$ (0° to 30°)

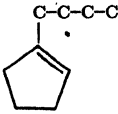
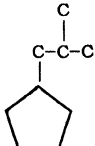
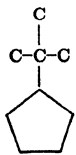
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,3-Dimethylcyclopentene-1 	-124.8 ¹⁴ -118.1 ²⁰	96 to 97 ¹⁴ 95.48 to 95.50 ²⁰	0.780₅ 0.77155 ²⁰ @ 30° 0.7831 ¹⁴ 0.78055 ²⁰ 0.78512 ²⁰ @ 15° 0.79855 ²⁰ @ 0°	1.43030 ²⁰ n _{Hα} ²⁰ 1.4321 ¹⁴ n _{Hα} ²⁰ 1.43972 ²⁰ n _{Hβ} ²⁰ 1.44153 ¹⁴ n _{Hβ} ²⁰ 1.44508 ²⁰ n _{Hγ} ²⁰ 1.44724 ¹⁴ n _{Hγ} ²⁰	$\frac{dD}{dt} = -0.0009/^\circ\text{C.}$ (0° to 30°)
3,3-Dimethylcyclopentene-1 		78 to 78.5 ³⁶ @ 754mm	0.7580³⁶ D ₀ ²⁰	1.4190³⁶	

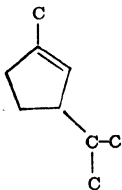
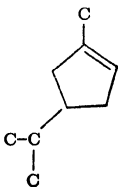
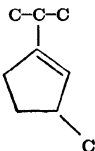
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Propylcyclopentene-1 	-100.3 ¹⁸	131.5 to 132.5 ¹⁸ 131 to 133 ²⁴	0.8015 ¹⁵ 0.8062 ²⁴ 0.8056 ¹⁸ @ 15°	1.4450 ¹⁵ 1.4423 ¹⁵ n _{H_a} ²⁰ 1.4516 ¹⁸ n _{H_β} ²⁰ 1.4574 ¹⁸ n _{H_γ} ²⁰	
1-Isopropylcyclopentene-1 		131.4 to 133.4 ⁴³ 133 to 135 ²⁴ @ 755mm	0.8141 ⁴³	1.45064 ⁴³	
1-Methyl-2-ethylcyclopentene-1 		127.4 to 127.8 ¹⁷	0.8020 ¹⁷ 0.8190 ¹⁷ @ 0°	1.4490 ¹⁷ 1.4452 ¹⁷ n _{H_a} ²⁰ 1.4549 ¹⁷ n _{H_β} ²⁰ 1.4608 ¹⁷ n _{H_γ} ²⁰	$\frac{dD}{dt} = -0.0008/^\circ\text{C.}$ (0° to 20°)

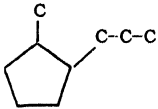
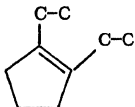
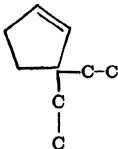
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
d-1,2,3-Trimethyl- cyclopentene-1 (Laurolene) <div style="text-align: center;">  </div>		121 122 to 123 ⁷⁰ 121 to 122 ⁵⁹ 119 to 120.5 ²¹ 120.3 to 121 ⁴⁷ @ 750mm	0.796, 0.7939 ²¹ D ₂₅ ²⁵ 0.7974 ²¹ D ₂₀ ²⁰ 0.7991 ⁴⁷ D ₂₀ ²⁰ 0.79650 ²¹ @ 19.5° 0.7988 ⁷⁰ @ 18.5° 0.8008 ⁵⁹ @ 17.5° 0.8010 ²¹ D ₁₅ ¹⁵ 0.8030 ⁴⁶ @ 15° 0.8048 ²¹ D ₁₀ ¹⁰ 0.8097 ²¹ @ 4°	1.4466 ⁷⁰ @ 18° 1.44376 ⁵⁹ @ 17.5° 1.44253 ²¹ n _{H_a} ^{19.5} 1.45246 ²¹ n _{H_β} ^{19.5} 1.45845 ²¹ n _{H_γ} ^{19.5}	$[\alpha]_D^{17.5} = +19.9^\circ$ ⁵⁹ $[\alpha]_D^{26.2} = +28.15^\circ$ ⁴⁷ $[\alpha]_D^{23} = +22.8^\circ$ ⁴⁶ $[\alpha]_D^{15} = +23.6^\circ$ ⁴⁶ $[\alpha]_D = +22.9^\circ$ ⁷⁰ $\frac{dD}{dt} = -0.00084/^\circ\text{C.}$ (5° to 25°)

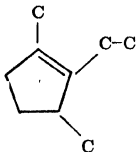
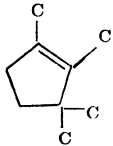
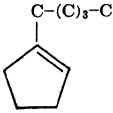
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-1,2,3-Trimethyl- cyclopentene-1					$[\alpha]_D^{20} = -14.5^\circ$ ⁴⁶
(Laurolene)		119 ¹	0.7871 ⁴⁹	1.44315 ⁴⁹	$[\alpha]_D^{20} = -15.72^\circ$ ⁴⁷
		118 to 122 ⁴⁹	@ 25°	@ 25°	$[\alpha]_D^{27} = -18.13^\circ$ ⁴⁷
			0.7923 ⁴⁹	1.44426 ⁴⁹	$[\alpha]_D = -29.2^\circ$ ⁶²
			0.80187 ¹	@ 25°	
			@ 18.6°	1.4479 ¹	
			0.798 ⁶²	@ 18°	$\frac{dD}{dt} = -0.0006_8/^\circ\text{C.}$ (15° to 20°)
			@ 16°	1.43972 ⁴⁹	
			0.8043 ⁴⁸	$n_{H_a}^{25}$	
			@ 15°	1.44121 ⁴⁹	
				$n_{H_a}^{25}$	
				1.44988 ⁴⁹	
				$n_{H_\beta}^{25}$	
				1.45099 ⁴⁹	
				$n_{H_\beta}^{25}$	
				1.45555 ⁴⁹	
				$n_{H_\gamma}^{25}$	
				1.45695 ⁴⁹	
				$n_{H_\gamma}^{25}$	
1,2,3-Trimethyl- cyclopentene-1					
(Laurolene)		120 to 122 ⁴⁸	0.7950 ⁷⁰	1.4421 ⁷⁰	
(Inactive)		120 to 121 ⁷⁰	0.8039 ⁴⁸	1.4464 ⁴⁸	
		@ 752mm	@ 15°	@ 16.5°	
			0.8030 ⁴⁸	1.4471 ⁴⁸	
			@ 15°	@ 16.5°	

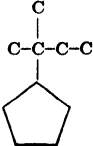
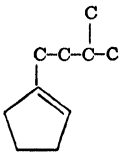
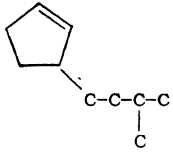
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
2,3,3-Trimethyl- cyclopentene-1 (Isolaurole) <div>  </div>		108.5 109.2 ⁴⁰ 108 to 110 ²² 108 ² 108.5 ⁵ @ 758mm 108.5 to 109 ³⁷ @ 754mm 108 to 108.2 ²¹ @ 742mm 109.2 ⁷⁰ @ 736mm 108 to 108.2 ⁷¹ @ 736mm	0.783, 0.7795 ²¹ D_{25}^{25} 0.7830 ²¹ D_{20}^{20} 0.7824 ³⁷ D_0^{20} 0.782 ² 0.7812 ^{70,71} 0.78510 ²¹ @ 16.1° 0.7955 ⁴⁰ @ 15° 0.7868 ³⁷ D_0^{15} 0.7867 ²¹ D_{15}^{15} 0.7871 ³⁷ D_{15}^{15} 0.7949 ²² @ 11.5° 0.7907 ²¹ D_{10}^{10} 0.7953 ²¹ @ 4°	1.433 1.4333 ^{70,71} 1.4324 ³⁷ 1.43227 ²¹ $n_H^{16,1}$ 1.44136 ²¹ $n_H^{16,1}$ 1.44690 ²¹ $n_H^{16,1}$	$\frac{dD}{dt} = -0.0007_8/^\circ\text{C.}$ (0° to 25°)

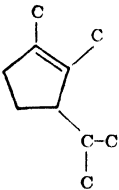
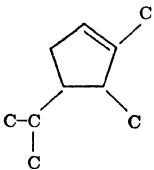
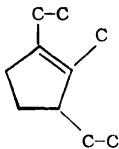
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Butylcyclopentene-1 	-95.75 ¹⁵	157.5 to 158 ¹⁵	0.8101 ¹⁵ @ 17.8° 0.8123 ¹⁵ @ 15°	1.4488 ¹⁵ @ 21.3° 1.4461 ¹⁵ n _H ^{21.2} 1.4554 ¹⁵ n _{Hβ} ^{21.2} 1.4610 ¹⁵ n _{Hγ} ^{21.2}	
Isobutylcyclopentene-x 		87 to 88 ²⁴ @ 20mm	0.8203 ²⁴	1.46046 ²⁴ n _H ²⁰	
2-Methyl-(2-cyclopenten-x-yl)-propane <i>(tert-Butylcyclopentene-x)</i> 		139.6 ⁵¹	0.7861 ⁵¹ @ 40° 0.8021 ⁵¹	1.4417 ⁵¹	

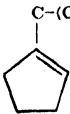
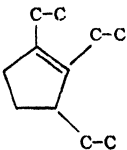
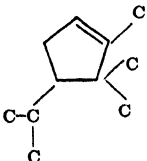
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-3-isopropyl- cyclopentene-1 		144 to 146 ⁶⁶	0.801 ⁶⁶	1.4478 ⁶⁶	
d-1-Methyl-4-iso- propylcyclopentene-1 (Apofenene) 		143 ⁷ 142 to 143 ⁶³	0.7945 ⁶³ @ 21° 0.812 ⁷ @ 0°	1.4403 ⁶³ @ 21°	[α] _D = +66.21° ⁶³
3-Methyl-1-isopropyl- cyclopentene-1 		138 to 139 ⁶⁶ 136 to 138 ⁸ 39 to 41 ⁸ @ 16mm	0.791 ⁶⁶ @ 22°	1.4380 ⁶⁶ @ 22°	


Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-2-propyl-cyclopentene-x 	- 130 ¹⁹	150.15 to 150.25 ¹⁹	0.8059 ¹⁹ 0.8223 ¹⁹ @ 0°	1.4497 ¹⁹ 1.4468 ¹⁹ n _{H_a} ²⁰ 1.4566 ¹⁹ n _{H_β} ²⁰ 1.4623 ¹⁹ n _{H_γ} ²⁰	
1,2-Diethyl-cyclopentene-1 	- 120 ¹⁸	148 to 149 ¹² @ 761mm 149.20 to 149.30 ¹⁸ 151 to 152 ³⁹ @ 751mm	0.8136 ¹² @ 25° 0.8088 ¹⁸ 0.8124 ³⁸ D ₀ ²⁰ 0.8331 ¹² @ 0° 0.8252 ¹⁸ @ 0°	1.4512 ¹⁸ 1.4524 ³⁸ 1.4484 ¹⁸ n _{H_a} ²⁰ 1.4582 ¹⁸ n _{H_β} ²⁰ 1.4640 ¹⁸ n _{H_γ} ²⁰	
3,3-Diethylcyclopentene-1 		144 to 146 ³⁸ @ 761mm 143.5 to 144.5 ^{38,39} @ 754mm	0.8083 ³⁸ D ₀ ²⁰ 0.8084 ^{38,39} D ₀ ²⁰	1.4469 ³⁸ 1.4455 ^{38,39}	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰ n _{H_a} ²⁰	Additional Data
1,3-Dimethyl-2-ethylcyclopentene-1 		140 ²	0.803 ²	1.447 ² n _{H_a} ²⁰	
1,2,3,3-Tetramethylcyclopentene-1 (Campholene*) 		133 to 135 ⁵⁸ 132 ⁶ 129 to 130.5 ⁵⁷ 135.5 ³ @ 755mm	0.8034 ⁵⁸ 0.8035 ⁶ @ 15° 0.8034 ⁵⁷ @ 14.5° 0.8134 ¹ @ 0°	1.44406 ⁵⁸ 1.4446 ⁶ 1.4445 ⁵⁷ @ 14.5°	*Investigators do not agree concerning this structure for campholene.
C₁₀H₁₈ 1-Pentylcyclopentene-1 		178 to 180 ⁵³			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1,1-Dimethylpropyl- cyclopentene-x (tert-Pentylcyclopentene-x) 		163 to 165 ⁵¹ @ 743mm	0.8256 ⁵¹	1.4548 ⁵¹	
1-(3-Methylbutyl)- cyclopentene-1 		168 to 170 ³² @ 25°	0.8010 ³² @ 25°	1.4467 ³² @ 25°	
3-(3-Methylbutyl)- cyclopentene-1 		86 to 87 ° @ 59mm	0.7969 ° @ 22°		


Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
1,1,2-Dimethyl-3-isopropylcyclopentene-1 		156 to 156.6 ⁵² @ 757.5mm 46.2 to 47 ⁵² @ 15mm	0.811 ⁵² @ 15°	1.447 ⁵² @ 17.6°	$[\alpha]_D^{17.6} = -2.0^\circ$ ⁵²
2,3-Dimethyl-4-isopropylcyclopentene-1 		164 to 166 ⁶⁴ 163 to 165 ⁶⁴ 161 to 164 ⁶⁴ 157 to 159 ⁶⁰ @ 750mm	0.8085 ⁶⁴ @ 22° 0.8100 ⁶⁴ D_{21}^{21} 0.8046 ⁶⁰ 0.8100 ⁶⁴ @ 18.5°	1.4503 ⁶⁴ @ 22° 1.4466 ⁶⁴ @ 21° 1.44591 ⁶⁰ 1.4514 ⁶⁴ @ 18.5°	
2-Methyl-1,3-diethylcyclopentene-1* 		164 *	0.811 ²	1.450 * $n_{H_a}^{20}$	*Investigator quotes data from Hoving, Tabl. Annuelles, II, 151, 1911.

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Hexylcyclopentene-1 		204 to 205 ⁷² @ 740mm	0.8079 ⁷²	1.4490 ⁷²	
1,2,3-Triethylcyclopentene-1* 		181.5 ²	0.814 ²	1.451 ² n _H ²⁰ _a	*Investigator quotes data from Hoving, Tabl. Annuelles, II, 151, 1911.
1-2,3,3-Trimethyl-4-isopropylcyclopentene-1 		168 to 170 ¹⁰	0.8095 ¹⁰ @ 19°	1.4521 ¹⁰ @ 19°	[α] _D ¹⁴ = -6.44° ¹⁰

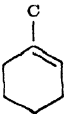
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Dodecylcyclopentene-1  C-(C) ₁₀ -C		172 ° @ 15mm	0.8262 ° @ 18°	1.45667 °	

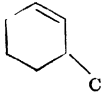
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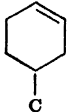
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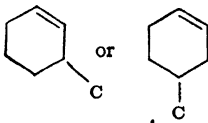
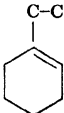
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclohexene 	- 80 ⁶⁶	83	0.8098₆	1.4465	$\frac{dD}{dt} = -0.000940_{\pm}$ $(1-0.000315t)/^{\circ}\text{C.}$ $(10^{\circ} \text{ to } 100^{\circ})$ $\frac{dn}{dt} = -0.000530_{\pm}/^{\circ}\text{C.}$ $(10^{\circ} \text{ to } 30^{\circ})$ Reference ¹³ gives n_{Li} and n_{Ti} .
		83 ¹⁰⁷ @ 777mm	0.7355 ²⁶ @ 100°	1.4428 ¹³⁶ @ 27°	
		83.5 ²⁴ @ 765mm	0.7713 ¹⁰⁷ @ 61.8°	1.4437 ⁵¹ @ 25°	
		82.3 ³⁰ @ 764mm	0.7720 ¹⁰⁷ @ 61.1°	1.4445 ²⁶ @ 25°	
		84 ⁶⁹ @ 763mm	0.7731 ¹⁰⁷ @ 59.8°	1.44507 ¹⁴ @ 22.1°	
		83 to 84 ⁵⁵ @ 762mm	0.7823 ²⁶ @ 50°	1.445 ¹² @ 21°	
		83 to 84 ⁷⁹ @ 761mm	0.7890 ¹⁰⁷ @ 41.9°	1.44637 ¹²⁷ @ 20.05°	
		84 to 86 ¹⁰⁸	0.7896 ¹⁰⁷ @ 41.2°	1.4459 ¹³⁵	
		83.5 ^{130, 136}	@ 41.2°	1.4460 ¹³⁰	
		83.3 ¹⁶	0.8054 ¹³⁶ @ 27°	1.44646 ¹⁰⁷	
		83.1 ²⁶	@ 27°	1.4465 ¹⁸	
		83 to 83.5 ³	0.8034 ⁵¹ @ 25°	1.4469 ^{26, 69}	
		83 to 84 ^{12, 49, 82}	0.8064 ¹⁰⁷ @ 22.7°	1.44577 ⁷⁹ @ 18.7°	
		82.7 ¹⁶	@ 22.7°	1.44902 ¹⁸	
		82 to 84 ^{9, 45}	0.8081 ¹⁴ @ 22.1°	@ 16.4°	
		81.5 to 82.5 ⁵¹	0.809 ¹² @ 21°	1.44921 ⁸ @ 15.1°	
		81 to 82 ²⁸	@ 21°	1.4494 ³¹ @ 13.5°	
		80 to 81 ²⁷	0.8021 ⁴⁵	@ 13.5°	
		82.8 ¹²⁷ @ 759mm	0.805 ¹⁰⁸ 0.8088 ¹⁰⁷	1.44235 ¹⁴ $n_{H_a}^{22.1}$	
		81.5 to 82.5 ⁷⁸ @ 756mm	0.8098 ¹³⁰ 0.810 ²	1.44360 ¹²⁷ $n_{H_a}^{20.05}$	
		83 to 84 ¹³⁶ @ 753mm	0.8101 ¹⁶ 0.8102 ¹⁴	1.44369 ¹⁰⁷ $n_{H_a}^{20}$	
		83 to 84 ⁵⁹ @ 752mm	0.8104 ²⁶ 0.8112 ⁶⁹	1.44302 ⁷⁹ $n_{H_a}^{19.7}$	
			0.7995 ⁷⁴ D_{20}^{20}	1.44516 ²⁴ $n_{H_a}^{18.4}$	
			0.809 ²⁷ D_v^{20}	1.44610 ²⁵ $n_{H_a}^{19.5}$	
				1.44623 ¹⁸ $n_{H_a}^{16.4}$	
				1.44653 ⁸ $n_{H_a}^{15.1}$	

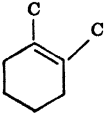
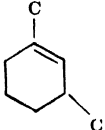
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclohexene (Continued)					
			0.8113 ⁷⁸ @ 18.7°	1.43998 ⁷⁴ $n_{H_a}^{14.4}$	
			0.8120 ²⁴ @ 18.4°	1.45184 ¹⁴ $n_{H_\beta}^{22.1}$	
			0.8111 ¹⁰⁷ @ 17.4°	1.45312 ¹²⁷ $n_{H_\beta}^{20.05}$	
			0.8138 ^{25,31} @ 16.5°	1.45326 ¹⁰⁷ $n_{H_\beta}^{20}$	
			0.8143 ^{3,107} @ 15.6°	1.45252 ⁷⁹ $n_{H_\beta}^{18.7}$	
			0.8147 ³ @ 15.1°	1.45475 ²⁴ $n_{H_\beta}^{18.4}$	
			0.8156 ²⁴ @ 14.9°	1.45573 ²⁵ $n_{H_\beta}^{16.5}$	
			1.79934 ⁷⁴ @ 14.4°	1.45596 ¹⁸ $n_{H_\beta}^{16.4}$	
			0.8183 ³¹ $D_{18.5}^{18.5}$	1.45620 ³ $n_{H_\beta}^{16.1}$	
			0.80893 ⁶⁹ D_0^0	1.44943 ⁷⁴ $n_{H_\beta}^{14.4}$	
				1.45743 ¹⁴ $n_{H_\gamma}^{22.1}$	
				1.45874 ¹²⁷ $n_{H_\gamma}^{20.05}$	
				1.45854 ¹⁰⁷ $n_{H_\gamma}^{20}$	
				1.45827 ⁷⁹ $n_{H_\gamma}^{18.7}$	
				1.46039 ²⁴ $n_{H_\gamma}^{18.4}$	
				1.46133 ²⁵ $n_{H_\gamma}^{16.5}$	
				1.46194 ³ $n_{H_\gamma}^{16.1}$	
				1.45507 ⁷⁴ $n_{H_\gamma}^{14.4}$	


Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methylcyclohexene-1 		109.5 109.1 to 109.3 ² @ 772mm 110.5 to 111.5 ²⁹ @ 770mm 109.5 to 110.5 ⁷⁹ @ 770mm 110 ¹⁰⁷ @ 769mm 108.0 to 108.5 ²² @ 769mm 109 ⁸² @ 768mm 109.6 to 110.2 ⁷⁹ @ 767mm 103.5 ⁸² @ 767mm 111 to 112 ^{21, 112} 110.6 ³¹ 110.5 to 111 ^{130, 133} 110 to 112 ³⁰ 110 to 110.5 ¹⁰⁰ 110 ^{8, 44} 109 to 110 ⁹⁸ 108 ^{82, 83, 84} 106 to 107 ¹¹¹ 103 to 105 ^{82, 85} 107.5 to 108.5 ⁴⁶ @ 759.5mm 108.9 to 109.2 ² @ 754mm	0.811, ⁷ 0.7734 ¹⁰⁷ @ 62.1° 0.7743 ¹⁰⁷ @ 61.1° 0.7912 ¹⁰⁷ @ 42.1° 0.7918 ¹⁰⁷ @ 41.4° 0.799 ¹¹¹ 0.8066 ⁴⁹ 0.8099 ^{130, 133} 0.810 ⁸ 0.8103 ² 0.8106 ^{22, 107} 0.840 ¹¹² 0.8118 ⁴⁴ 0.8122 ⁷² 0.8127 ¹⁰⁷ 0.8022 ⁵³ D ₂₀ ²⁰ 0.809 ⁹⁸ D ₂₀ ²⁰ 0.80305 ⁶² D ₁₅ ²⁰ 0.7999 ⁶² D ₀ ²⁰ 0.8005 ⁸² D ₀ ²⁰ 0.8115 ² @ 18.5° 0.8115 ⁷⁹ @ 18.2° 0.8075 ⁴⁶ D ₁₈ ¹⁸ D ₁₈ ²⁰ 1.46328 ⁷⁹ n _H ^{17, 9} _γ	1.450, ¹¹¹ 1.44234 ¹¹¹ 1.4496 ¹¹² 1.4497 ^{2, 8} 1.4498 ⁹⁸ 1.4503 ⁷² 1.45067 ¹⁰⁷ 1.4503 ² @ 18.5° 1.44094 ⁴⁶ @ 18° 1.45042 ⁷⁹ @ 17.9° 1.4499 ¹³⁰ @ 17.5° 1.4508 ⁴⁹ @ 17.5° 1.4543 ^{31, 23} @ 13.5° 1.458 ⁸² @ 12° 1.44766 ¹⁰⁷ n _H ²⁰ _a 1.44744 ² n _H ^{18, 6} _a 1.44763 ⁷⁹ n _H ^{17, 9} _a 1.45745 ¹⁰⁷ n _H ²⁰ _β 1.45711 ² n _H ^{18, 6} _β 1.45735 ⁷⁹ n _H ^{17, 9} _β 1.46259 ¹⁰⁷ n _H ²⁰ _γ 1.46293 ² n _H ^{18, 6} _γ 1.46328 ⁷⁹ n _H ^{17, 9} _γ	$\frac{dD}{dt} = -0.0009, /^{\circ}\text{C.}$ (15° to 65°)

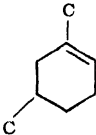
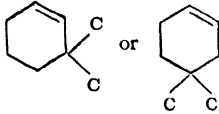
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Methylcyclohexene-1 (Continued)		109 to 110 ⁷² @ 753mm	0.8117 ⁷⁹ @ 17.9°		
		106 to 107 ⁴⁴ @ 751.5mm	0.8145 ² @ 14.8°		
		108 ⁸³ @ 747mm	0.8182 ¹⁰⁷ @ 14.2°		
			0.8257 ^{31,33} $D_{13.5}^{13.5}$		
			0.8166 ⁶² @ 0°		
			0.8172 ⁶² D_0^0		
			0.821 ⁸⁵ D_0^0		
			0.823 ⁶² D_0^0		
			0.827 ^{63,64} D_0^0		
3-Methylcyclohexene-1 		104.4			
		105 to 106 ⁵⁰	0.7950 ³⁶ @ 26°	1.4408 ³⁶ @ 26°	
		105 ⁶²	0.80177 ⁵³ $D_{21.5}^{21.5}$	1.44236 ⁵³ 1.4445 ^{6,109}	
		104 to 105 ³⁶	0.8048 ⁵⁰ @ 20.3°	1.4454 ⁵⁰ 1.4451 ¹³⁰	
		104 ^{60,130}	0.805 ⁶ @ 17°	1.4459 ³⁵ @ 14°	
		103 to 105 ^{6,82,109}	0.806 ¹⁰⁹		
		103.25 to 103.5 ⁵³	0.8009 ¹³⁰ 0.803 ³⁵ @ 14°		
		@ 752mm			
		104 ³⁵ @ 743mm			

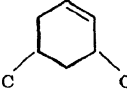
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
4-Methylcyclohexene-1 		102.5 to 102.7 ⁷⁰ @ 772mm 103 to 106 ⁴⁷ @ 765mm 104 to 105 ¹² @ 762mm 102 to 103 ³⁷ 102.5 to 103.5 ⁹⁵ 102.5 to 103 ¹²⁰ 102.8 to 103 ¹⁰⁰ 103 ⁶¹ 105 ^{57,82} 102 to 102.5 ⁵⁵ @ 755mm 101 to 102 ⁶¹ @ 754mm 101.9 ^{60,61} @ 753mm 102.5 ²⁴ @ 750mm 102.5 ⁸⁵ @ 743mm	0.8000 ¹³⁰ 0.8001 ⁷⁰ 0.8003 ^{60,61} D_{20}^{20} 0.7986 ^{60,61} D_0^{20} 0.8023 ²⁴ @ 17.6° 0.804 ¹² @ 17° 0.8047 ^{60,61} D_{15}^{15} 0.805 ³⁵ @ 14° 0.8086 ^{31,32} $D_{13.5}^{13.5}$ 0.819 ⁸² D_0^0 0.8207 ^{60,61} D_0^0	1.4419 ⁷⁰ 1.4423 ¹³⁰ @ 18° 1.442 ¹² @ 17° 1.4445 ³⁵ @ 14° 1.4449 ^{31,32} @ 13.5° 1.44138 ²⁴ $n_{H_a}^{17.6}$ 1.45069 ²⁴ $n_{H_\beta}^{17.6}$ 1.45620 ²⁴ $n_{H_\gamma}^{17.6}$	
d-4-Methyl- cyclohexene-1		102 ¹²⁸ @ 757mm 101.9 ⁶¹ @ 753mm	0.8002 ¹²⁸ @ 16°	1.4443 ¹²⁸ @ 16°	$[\alpha]_D^{20} = +110^\circ$ ⁵⁸ $[\alpha]_D^{20} = +107.05$ ¹²⁶

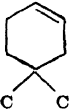
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3- or 4-Methyl- cyclohexene-1 		106 to 107 ¹¹⁸ 103 to 103.5 ¹³⁹ @ 750mm 105 to 106 ¹³⁶ @ 745mm	0.7937 ¹²⁹ @ 27° 0.799 ¹¹⁸ 0.8019 ¹³⁶	1.4387 ¹²⁹ @ 27° 1.44234 ¹¹⁸ 1.4444 ¹³⁶	$[\alpha]_D = +17.78^\circ$ ¹³⁶ $[\alpha]_D = +81.47^\circ$ ¹³⁹
C₈H₁₄ 1-Ethylcyclohexene-1 		135 to 136 ² @ 768mm 135.8 to 136.8 ⁷⁹ @ 768mm 135.7 to 136.6 ⁹⁸ 134 to 136 ¹²⁴ 134 to 134.5 ²² 134 to 135 ¹²⁴ 134 ^{83,84} 134 to 135 ⁴⁹ @ 751.5mm 49 ¹¹ @ 30mm	0.8171 ⁴⁹ 0.8217 ²² 0.8260 ^{63,124} 0.828 ⁹⁸ D ₂₀ ²⁰ 0.8238 ² @ 19 1° 0.8235 ¹²⁴ @ 19° 0.8268 ⁷⁹ @ 15.5° 0.8270 ⁷⁹ @ 15.25°	1.4547 ⁴⁹ @ 22.3° 1.4583 ⁹⁸ 1.4576 ^{63,124} 1.4567 ³² @ 19.05° 1.4591 ¹²⁴ @ 19° 1.45966 ⁷⁹ @ 15.25° 1.45386 ² n _{H_a} ^{19.06} 1.45694 ⁷⁹ n _{H_a} ^{15.25} 1.46347 ² n _{H_β} ^{19.06} 1.46673 ⁷⁹ n _{H_β} ^{15.25} 1.46944 ² n _{H_γ} ^{19.06} 1.47269 ⁷⁹ n _{H_γ} ^{15.25}	

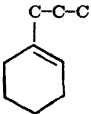
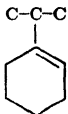
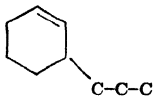
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,2-Dimethylcyclohexene-1 		136 136 to 137.5 ⁶⁴ 135.5 to 137.7 ¹⁷ 135.5 to 136.5 ¹³¹ 135.4 to 135.9 ⁹⁸ 135 to 137 ^{65, 114} 132 ^{82, 86}	0.823₂ 0.81495 ¹⁷ @ 30° 0.8226 ¹³¹ 0.82317 ¹⁷ 0.8234 ⁴⁵ 0.824 ^{64, 114} 0.826 ⁹⁸ D_{20}^{20} 0.8269 ¹³¹ @ 15° 0.82726 ¹⁷ @ 15° 0.830 ⁸² @ 14° 0.8315 ³ @ 13.7° 0.8317 ³ @ 13.5° 0.8411 ^{82, 86} D_0^0	1.4580 ¹³¹ @ 21.5° 1.460 ⁶⁴ 1.4590 ⁹⁸ 1.4587 ¹¹⁴ 1.45664 ⁶⁵ 1.462 ⁸² @ 14° 1.46178 ³ @ 13.5° 1.45643 ¹⁷ $n_{H_a}^{20}$ 1.45906 ³ $n_{H_a}^{13.5}$ 1.46663 ¹⁷ $n_{H_\beta}^{20}$ 1.46908 ³ $n_{H_\beta}^{13.5}$ 1.47244 ¹⁷ $n_{H_\gamma}^{20}$ 1.47517 ³ $n_{H_\gamma}^{13.5}$	$\frac{dD}{dt} = -0.0008_2/^\circ\text{C.}$ (15° to 30°)
1,3-Dimethylcyclohexene-1 		128.0 to 128.4 ¹⁷ 124 to 126 ⁸⁰	0.802₆ 0.79448 ¹⁷ @ 30° 0.8006 ⁸⁰ 0.8026 ¹⁷ 0.80677 ¹⁷ @ 15°	1.4487 ⁸⁰ 1.44501 ¹⁷ $n_{H_a}^{26}$ 1.45462 ¹⁷ $n_{H_\beta}^{20}$ 1.46013 ¹⁷ $n_{H_\gamma}^{20}$	$\frac{dD}{dt} = -0.00082/^\circ\text{C.}$ (15° to 30°)

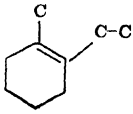
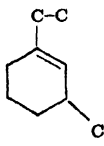
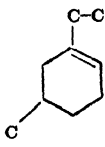
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,4-Dimethylcyclohexene-1 	-59.4 ¹⁷	127.5 127 to 129 ⁴⁹ @ 764mm 128.7 ¹⁷ 128.5 ^{131,135} 127 to 128 ¹¹⁴ 125.6 to 126 ³³ 125 ^{82,86,87} 127.5 to 128 ⁷¹ @ 756mm 124 to 126 ³ @ 751mm	0.801_s 0.79240 ¹⁷ @ 30° 0.7985 ³ @ 22.4° 0.7989 ³ @ 22° 0.8005 ^{131,132,135} @ 19° 0.80061 ¹⁷ 0.8024 ⁷¹ 0.8030 ⁴⁹ 0.8020 ¹¹⁴ @ 19.5° 0.80472 ¹⁷ @ 15° 0.8111 ^{82,87} @ 14° 0.8175 ^{31,33} $D_{13.5}^{13.5}$ 0.8207 ^{82,87} @ 0° 0.8208 ⁸⁶ D_0^0	1.445_s 1.44372 ³ @ 22° 1.4457 ^{131,132,135} 1.4459 ¹¹⁴ 1.4461 ⁷¹ 1.4502 ⁴⁹ @ 19° 1.451 ^{82,87} @ 14° 1.4486 ³¹ @ 13.5° 1.44112 ³ $n_{H_a}^{22,0}$ 1.44300 ¹⁷ $n_{H_a}^{20}$ 1.45056 ³ $n_{H_\beta}^{22,0}$ 1.45242 ¹⁷ $n_{H_\beta}^{20}$ 1.45626 ³ $n_{H_\gamma}^{22,0}$ 1.45805 ¹⁷ $n_{H_\gamma}^{20}$	$\frac{dD}{dt} = -0.00097/^\circ\text{C.}$ (0° to 30°)


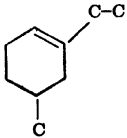
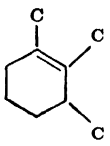
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,5-Dimethylcyclohexene-1 		127 127.5 to 128.5 ¹¹⁴ 127.4 to 127.8 ⁹⁸ 124 to 126 ³ 124 to 125 ⁵⁰ 124 ^{82,86} 127 to 129 ⁴⁹ @ 758mm 126 to 127 ¹³⁶ @ 750mm	0.7998 ³ @ 22.6° 0.8000 ³ @ 22.4° 0.8015 ¹³⁶ @ 22° 0.8025 ¹¹⁴ @ 21° 0.8056 ⁴⁹ 0.807 ⁷ 0.805 ⁹⁸ D_{20}^{20} 0.8005 ⁵⁰ @ 18° 0.8122 ⁸² @ 12° 0.8210 ^{82,86} D_0^0	1.44533 ³ @ 22.4° 1.4466 ¹³⁶ @ 22° 1.4466 ¹¹⁴ @ 21° 1.4430 ⁵⁰ 1.4480 ^{61,98} 1.451 ⁷ 1.4547 ⁴⁹ @ 19.5° 1.451 ⁸³ @ 12° 1.44263 ³ $n_H^{22,4}$ 1.45215 ³ $n_H^{22,4}$ n_H^0 1.45795 ³ $n_H^{22,4}$ n_H^0	
3,3-Dimethylcyclohexene-1 		118.5 to 120 ¹³⁴ @ 752mm	0.7970 ¹³⁴ @ 21°	1.4439 ¹³⁴ @ 21°	

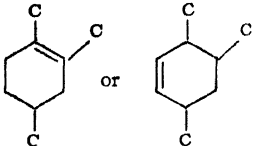
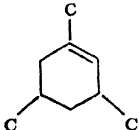
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,5-Dimethylcyclohexene-1 		125 to 126 ° @ 764mm 124 to 126 ° ⁹⁰ 124 to 125 ° ⁹⁰ 126 to 127 ° @ 746mm	0.797 ° @ 21.1° 0.8065 ° @ 20.6° 0.8062 ° @ 19.4° 0.8074 ° @ 18.4° 0.8101 ° @ 18.1° 0.8005 ° ⁹⁰ @ 18° 0.8009 ° @ 15.6°	1.44361 ° @ 21.1° 1.45083 ° @ 20.6° 1.44933 ° @ 20.2° 1.443 ° ⁹⁰ @ 18° 1.45372 ° @ 18° 1.45082 ° @ 17° 1.44603 ° @ 15.6° 1.44086 ° n _{H_a} ^{21.1} 1.44784 ° n _{H_a} ^{20.6} 1.44634 ° n _{H_a} ^{20.2} 1.44793 ° n _{H_a} ^{18.0} 1.45014 ° ¹⁷ n _{H_a} ¹⁷ 1.44315 ° n _{H_a} ^{15.6} 1.45020 ° n _{H_β} ^{21.1} 1.45801 ° n _{H_β} ^{20.0} 1.45642 ° n _{H_β} ^{20.2} 1.46078 ° n _{H_β} ^{18.0} 1.45800 ° n _{H_β} ¹⁷ 1.45263 ° n _{H_β} ^{15.6}	

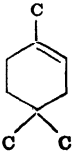
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
3,5-Dimethylcyclohexene-1 (Continued)				1.45587 ^s $n_{H\gamma}^{21.1}$ 1.46413 ⁷ $n_{H\gamma}^{20.6}$ 1.46255 ⁷ $n_{H\gamma}^{20.2}$ 1.46728 ⁷ $n_{H\gamma}^{18.0}$ 1.46390 ⁷ $n_{H\gamma}^{17}$ 1.45835 ^s $n_{H\gamma}^{15.6}$	
4,4-Dimethylcyclohexene-1 		117 to 117.5 ²⁰ @ 770mm 119.5 to 121.2 ^s @ 767mm 120 to 122 ⁴³ 120 to 122 ^s @ 750mm	0.7970 ²⁰ D_{25}^{25} 0.803 ^s 0.8092 ⁴³ @ 16.6° 0.8056 ^s @ 16.2° 0.80267 ²⁰ @ 15.8° 0.8040 ²⁰ D_{15}^{15} 0.8089 ^s @ 13.5° 0.8129 ²⁰ @ 4°	1.4435 ^s 1.4479 ⁴³ @ 16.6° 1.44521 ^s @ 16.2° 1.44251 ^s $n_{H\alpha}^{19.2}$ 1.44218 ²⁰ $n_{H\alpha}^{15.8}$ 1.44604 ^s $n_{H\alpha}^{13.6}$ 1.45182 ^s $n_{H\beta}^{16.2}$ 1.45137 ²⁰ $n_{H\beta}^{15.8}$ 1.45531 ^s $n_{H\beta}^{13.6}$ 1.45722 ^s $n_{H\gamma}^{19.2}$ 1.45700 ²⁰ $n_{H\gamma}^{15.8}$ 1.46100 ^s $n_{H\gamma}^{13.6}$	

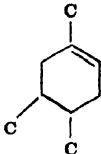
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Propylcyclohexene-1 		154.7 to 157.7 ⁹⁸ 154.5 to 155.5 ^{97,120} 154 ^{83,84}	0.826 ⁹⁸ D ₂₀ ²⁰ 0.838 ¹²⁰ @ 19° 0.8181 ⁹⁷ @ 19°	1.4578 ⁹⁸ 1.4541 ⁹⁷ @ 19° 1.4579 ¹²⁰ @ 19°	
1-Isopropylcyclohexene-1 		156.5 ² @ 772mm 156 ^{2,8} 155 to 157 ¹²³ 151.7 to 154.5 ⁹⁸ 161 to 162 ²² @ 755mm 87 to 88 ²² @ 20mm	0.826 ^{2,3,6} 0.829 ¹²³ 0.830 ⁹⁸ D ₂₀ ²⁰ 0.8302 ² @ 15.2° 0.8320 ² @ 12.9°	1.4594 ⁹⁸ 1.4593 ^{2,6} 1.4606 ¹²³ 1.46150 ² @ 15.2° 1.45884 ² n _{D_a} ^{15,2} 1.46851 ² n _{D_β} ^{15,2} 1.47436 ² n _{D_γ} ^{15,2}	
3-Propylcyclohexene-1 		155 to 156 ⁹⁶	0.8240 ⁹⁶ @ 19°	1.4564 ⁹⁶ @ 19°	

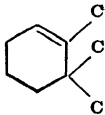
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-2-ethyl- cyclohexene-1 		156.7 to 157.0 ⁹⁸	0.832 ⁹⁸ D ₂₀ ²⁰	1.4630 ⁹⁸	
3-Methyl-1-ethyl- cyclohexene-1 or 5-Methyl-1-ethyl- cyclohexene-1  or 		149 to 151 ⁹⁸ 148 to 149 ⁹	0.813 ⁹ 0.8296 ⁹⁸ 0.8366 ⁹⁸ @ 0°	1.4537 ⁹ 1.454 ⁹⁸	
d-3-Methyl-1-ethyl- cyclohexene-1 or d-5-Methyl-1-ethyl- cyclohexene-1		148 to 149 ¹³⁶ @ 743mm	0.8087 ¹³⁶ @ 25°	1.4514 ¹³⁶ @ 25°	[α] _D = +56.8° ¹³⁶

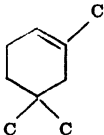
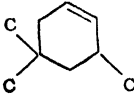
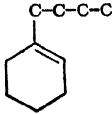
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
4-Methyl-1-ethyl- cyclohexene-1 		153 to 154 ¹¹⁶ 151.5 to 151.7 ⁹⁸ 151 to 152 ⁷¹ 149 ^{6,82,87}	0.814₆ 0.8145 ¹¹⁶ @ 22° 0.8133 ⁷¹ 0.814 ⁶ 0.814 ⁹⁸ D_{20}^{20} 0.8169 ^{82,87} @ 16° 0.8278 ^{82,87} @ 0°	1.452₆ 1.4514 ¹¹⁶ @ 22° 1.4510 ⁹ 1.4522 ⁷¹ 1.4528 ⁹⁸ 1.453 ^{82,87} @ 16°	$\frac{dD}{dt} = -0.00066/^\circ\text{C.}$ (0° to 20°)
4-Methyl-2-ethyl- cyclohexene-1 		151.9 to 152.1 ⁹⁸	0.815 ⁹⁸ D_{20}^{20}	1.4544 ⁹⁸	
1,2,3-Trimethyl- cyclohexene-1 		149.6 to 150 ⁴ @ 749mm	0.828 ⁴ 0.8347 ⁴ @ 11.75°	1.4593 ⁴ 1.46296 ⁴ @ 11.75° 1.46015 ⁴ $n_{H_a}^{11.75}$ 1.47021 ⁴ $n_{H_\beta}^{11.75}$ 1.47603 ⁴ $n_{H_\gamma}^{11.75}$	

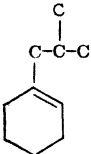
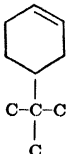
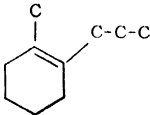
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,2,4-Trimethyl- cyclohexene-1 or -5 			0.8184 ^{31,33} $D_{18.5}^{13.5}$	1.4561 ^{31,33} @ 13.5°	
1,3,5-Trimethyl- cyclohexene-1 		139 to 141 ³ @ 766mm 142.5 to 143.5 ¹²⁵ 140.5 to 142 ³ 140 ³	0.7941 ³ @ 24.7° 0.7965 ¹²⁵ @ 21° 0.8025 ³ @ 14.3° 0.8048 ³ @ 13.8° 0.8031 ³ @ 13.5°	1.44378 ³ @ 24.7° 1.447 ¹²⁵ @ 21° 1.44909 ³ @ 13.5° 1.44917 ³ @ 13.1° 1.44102 ³ $n_{H_a}^{24.7}$ 1.44604 ³ $n_{H_a}^{13.5}$ 1.44625 ³ $n_{H_o}^{13.1}$ 1.45057 ³ $n_{H_\beta}^{24.7}$ 1.45591 ³ $n_{H_\beta}^{13.1}$ 1.45596 ³ $n_{H_\beta}^{13.1}$ 1.45638 ³ $n_{H_\gamma}^{24.1}$ 1.46155 ³ $n_{H_\gamma}^{13.5}$ 1.46154 ³ $n_{H_\gamma}^{13.1}$	

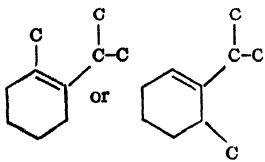
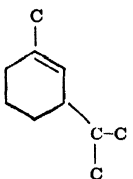
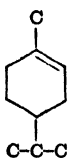
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,4,4-Trimethyl- cyclohexene-1 		139.5 to 140.5 ° 44.4 ° @ 21mm 36.3 to 37.3 ° @ 14mm	0.8021 ° @ 23.15° 0.804 ° 0.8032 ° @ 18.8° 0.8096 ° @ 15.1° 0.8098 ° @ 14.8°	1.44422 ° @ 23.15° 1.4456 ° 1.44592 ° @ 18.9° 1.44921 ° @ 15.1° 1.44152 ° $n_{H_a}^{23.16}$ 1.44322 ° $n_{H_a}^{18.9}$ 1.44643 ° $n_{H_a}^{15.1}$ 1.45086 ° $n_{H_\beta}^{22.16}$ 1.45263 ° $n_{H_\beta}^{18.9}$ 1.45591 ° $n_{H_\beta}^{15.1}$ 1.45652 ° $n_{H_\gamma}^{22.16}$ 1.45822 ° $n_{H_\gamma}^{18.9}$ 1.46164 ° $n_{H_\gamma}^{15.1}$	

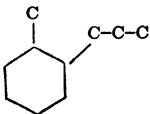
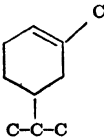
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
cis-1,4,5-Trimethyl- cyclohexene-1 		147 ⁹⁹	0.814 ⁹⁹	1.44905 ⁹⁹	
trans-1,4,5-Trimethyl- cyclohexene-1		145 ⁹⁹	0.805 ⁹⁹	1.44820 ⁹⁹	
1,4,5-Trimethyl- cyclohexene-1 (Mixtures of <i>cis</i> and <i>trans</i> isomers)		144 to 146 ¹	0.805 ¹ 0.8078 ¹ @ 16.25°	1.4482 ¹ 1.44990 ¹ @ 16.25° 1.44742 ¹ n _D ^{16.25} _α 1.45683 ¹ n _D ^{16.25} _β 1.46264 ¹ n _D ^{16.25} _γ	

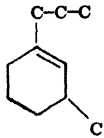
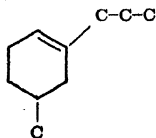
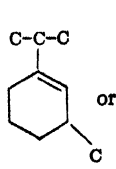
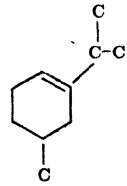
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
2,3,3-Trimethyl- cyclohexene-1 		146.2 to 147.2 ° @ 767mm 144 to 146 ° ³²	0.8217 ° @ 20.3° 0.8278 ° @ 15.0° 0.8300 ° @ 15.0° 0.862 ° ³² @ 14°	1.45603 ° @ 20.4° 1.45859 ° @ 14.8° 1.45889 ° @ 15.0° 1.4590 ° ³² @ 14° 1.45336 ° $n_{H_a}^{20.4}$ 1.45638 ° $n_{H_a}^{15.0}$ 1.45602 ° $n_{H_a}^{14.8}$ 1.46298 ° $n_{H_\beta}^{20.4}$ 1.46597 ° $n_{H_\beta}^{15.0}$ 1.46567 ° $n_{H_\beta}^{14.8}$ 1.46877 ° $n_{H_\gamma}^{20.4}$ 1.47173 ° $n_{H_\gamma}^{15.0}$ 1.47183 ° $n_{H_\gamma}^{14.5}$	

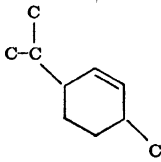
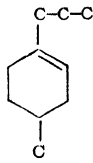
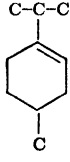
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
2,4,4-Trimethylcyclohexene-1 		138 to 139 ° 137 to 140 ¹⁹ 139 to 141 ⁵⁰ @ 759mm 138 to 142 ³⁸ @ 735mm	0.7981 ⁵⁰ @ 23° 0.7911 ³⁸ @ 21.5° 0.8094 ° @ 17.8° 0.8085 ¹⁹ D_{15}^{15} 0.8117 ° @ 14.4°	1.4453 ⁵⁰ @ 23° 1.44612 ³⁸ @ 21.5° 1.44671 ° @ 17.8° 1.4473 ° @ 14.4° 1.44402 ° $n_{H_a}^{17.8}$ 1.45332 ° $n_{H_\beta}^{17.8}$ 1.45900 ° $n_{H_\gamma}^{17.8}$	
3,5,5-Trimethylcyclohexene-1 		138 to 140 ¹⁰¹	0.7978 ¹⁰¹	1.4434 ¹⁰¹	
C₁₀H₁₈ 1-Butylcyclohexene-1 		180.8 to 182.9 ⁹⁸	0.828 ⁹⁸ D_{20}^{20}	1.4591 ⁹⁸	

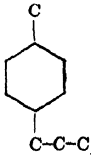
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-1-sec-Butylcyclohexene-1 		172 to 174 ⁵⁴ 172 to 174.5 ²² @ 755mm	0.8410 ²² 0.829 ⁵⁴ D ₂₀ ²⁰	1.4590 ⁵⁴	$[\alpha]_D^{20} = -4.06^\circ$ ⁵⁴
4-tert-Butylcyclohexene-1 		172 ⁷⁶ @ 745mm	0.8173 ⁷⁶ @ 40° 0.8315 ⁷⁶	1.4587 ⁷⁶	$\frac{dD}{dt} = -0.0007, /^\circ\text{C.}$ (20° to 40°)
1-Methyl-2-propylcyclohexene-1 		177.3 to 177.8 ⁹⁸	0.832 ⁹⁸ D ₂₀ ²⁰	1.4627 ⁹⁸	

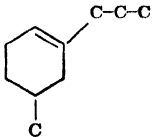
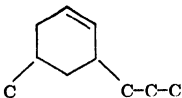
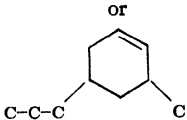
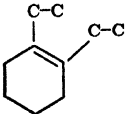
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1- or 3-Methyl-2-isopropylcyclohexene-1 		165 to 168 ^{48,108}			
1-Methyl-3-isopropylcyclohexene-1 		164 to 168 ¹¹⁹		1.4561 ¹¹⁹	
1-Methyl-4-isopropylcyclohexene-1 		174 to 175 ¹¹³	0.821 ¹¹³ @ 21°	1.4551 ¹¹³ @ 21°	

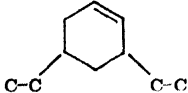
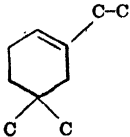
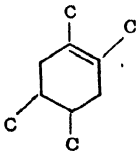
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
d-1-Methyl-4-iso-propylcyclohexene-1		175 to 177 ¹⁰⁶ 174 to 176 ⁸ 173 to 174 ⁹² 171 to 172 ⁹²	0.8258 ⁸ 0.829 ⁹² 0.8246 ¹⁰⁶ @ 18°	1.4580 ⁸ 1.4601 ⁹² 1.4563 ¹⁰⁶ @ 18°	
l-1-Methyl-4-iso-propylcyclohexene-1		172 to 174.5 ⁵²	0.8230 ⁵² @ 16.5°	1.45979 ⁵²	[α] _D = -2.07° ⁵²
1-Methyl-2-propyl-cyclohexene-x		167 to 170 ⁶⁸	0.848 ⁶⁸ 0.8611 ⁶⁸ @ 0°	1.469 ⁶⁸	
					
2-Methyl-4-isopropyl-cyclohexene-1		169 to 172 ⁹¹ 167 to 168 ⁴²	0.828 ⁹¹ 0.8222 ⁴² D ₂₀ ²⁰	1.462 ⁹¹ @ 0° 1.45683 ⁴²	
					

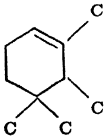
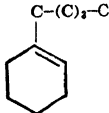
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Methyl-1-propyl-cyclohexene-1 or 4-Methyl-2-propyl-cyclohexene-1					
 or 		168 to 171 ⁵⁶	0.8302 ⁵⁶ @ 15° 0.8375 ⁵⁶ @ 0°	1.456 ⁵⁶	
3-Methyl-1-isopropyl-cyclohexene-1 or 4-Methyl-2-isopropyl-cyclohexene-1					[α] _D = +23.34° ³⁴
<i>d</i> -form		168 to 169 ⁷⁵ @ 764mm 165 ³⁴	0.8125 ³⁴ @ 25°	1.4519 ³⁴ @ 25°	
 or  <i>dl</i> -form		165 ³⁴	0.8154 ³⁴ @ 25°	1.4534 ³⁴ @ 25°	

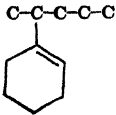
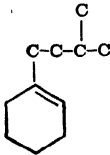
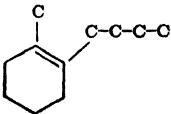
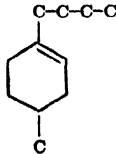
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Methyl-6-isopropyl-cyclohexene-1 		167.1 ¹³ @ 768.6mm 55 to 56 ⁹³ @ 12mm	0.824 ⁹³	1.461 ⁹³	
4-Methyl-1-propyl-cyclohexene-1 		173.2 to 174.2 ⁹⁸ 173 to 176 ^{117,118}	0.815 ⁹⁸ D ₂₀ ²⁰	1.4533 ⁹⁸	
4-Methyl-1-isopropyl-cyclohexene-1 		175 ¹⁰ 170 ⁸⁸ 166 to 167 ⁸²	0.823 ⁸² D ₀ ⁰ 0.827 ⁸⁸ D ₀ ⁰		

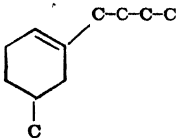
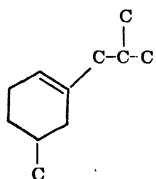
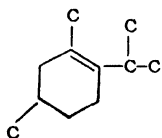
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
d-4-Methyl-1-iso-propylcyclohexene-1					$[\alpha]_D^{20} = +115.64^\circ$ ¹⁰⁴ $[\alpha]_D = +112.75^\circ$ ¹²⁸ $[\alpha]_D^{26.6} = +32.77^\circ$ ¹⁰⁵
		168 to 168.5 ¹²⁸ @ 758mm	0.7632 ²⁴ @ 79.8°	1.4532 ¹²⁸ @ 16°	
		165.5 ¹⁰⁶ @ 739mm	0.8118 ¹⁰⁴ 0.8132 ¹⁰⁶ 0.8132 ²⁴ @ 16.8° 0.8141 ¹²⁸ @ 16°	1.42042 ²⁴ $n_{H_a}^{79.8}$ 1.44970 ²⁴ $n_{H_a}^{16.8}$ 1.42920 ²⁴ $n_{H_\beta}^{79.8}$ 1.45906 ²⁴ $n_{H_\beta}^{16.8}$ 1.43432 ²⁴ $n_{H_\gamma}^{79.8}$ 1.46460 ²⁴ $n_{H_\gamma}^{16.8}$	
1-Methyl-4-propyl-cyclohexene-x		168 to 170 ^{82,87}	0.8270 ^{82,87} @ 16° 0.8387 ^{82,87} @ 0°	1.455 ^{82,87} @ 16°	
					

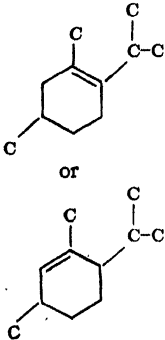
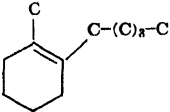
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
4-Methyl-2-propyl- cyclohexene-1 		172.6 to 173.2 ⁹⁸	0.816 ⁹⁸ D ₂₀ ²⁰	1.4546 ⁹⁸	
5-Methyl-3-propyl- cyclohexene-1 or 3-Methyl-5-propyl- cyclohexene-1  or 		169 to 170 ⁵⁰	0.8197 ⁵⁰ @ 16°	1.45609 ⁵⁰ @ 16°	
1,2-Diethylcyclo- hexene-1 		54 to 55 ⁸¹ @ 10mm			

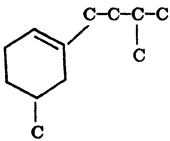
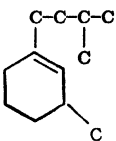
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,5-Diethylcyclohexene-1 		163 to 166 ⁴¹	0.83141 ⁴¹ D ₂₀ ²⁰	1.46519 ⁴¹	
4,4-Dimethyl-2-ethylcyclohexene-1 		69 @ 32mm ⁶	0.832 ⁶	1.4616 ⁶	
1^c,2^c,4,5-Tetramethylcyclohexene-1 		169 ⁹⁹	0.828 ⁹⁹	1.46053 ⁹⁹	
1^c,2^c,4,5-Tetramethylcyclohexene-1		166 ⁹⁹	0.817 ⁹⁹	1.45722 ⁹⁹	

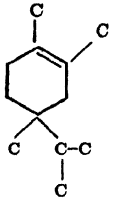
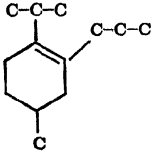
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2,4,5-Tetramethyl- cyclohexene-1		165 to 167 ¹	0.817 ¹ 0.8199 ¹ @ 16.5°	1.4572 ¹ 1.45880 ¹ @ 16.5° 1.45617 ¹ n _{H_a} ^{16.5} 1.46597 ¹ n _{H_β} ^{16.5} 1.47192 ¹ n _{H_γ} ^{16.5}	
2,3,4,4-Tetramethyl- cyclohexene-1 		169 to 172 ^{91,94} 167 to 169 ⁸⁹ 62.5 to 65 ⁵⁸ @ 17mm	0.828 ^{91,94} 0.8208 ⁸⁸ D ₂₀ ²⁰ 0.8328 ⁸⁹ D ₁₆ ¹⁶	1.462 ^{91,94} 1.4621 ⁸⁸ 1.4629 ⁸⁹ (n) 15°	
C₁₁H₂₀ 1-Pentylcyclohexene-1 		203.4 to 205 ⁹⁸	0.831 ⁹⁸ D ₂₀ ²⁰	1.4605 ⁹⁸	

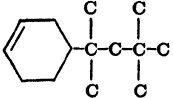
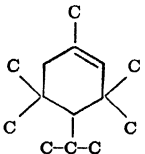
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Cyclohexen-1-yl-pentane 		194 ^{83,84}	0.856 ⁸⁴ D ₀ ⁰		
3-Methyl-1-cyclohexen-1-yl-butane 		194.5 to 196.5 ⁹⁸	0.826 ⁹⁸ D ₂₀ ²⁰	1.4596 ⁹⁸	
1-Methyl-2-butylcyclohexene-1 		197.8 to 199.1 ⁹⁸	0.833 ⁹⁸ D ₂₀ ²⁰	1.4637 ⁹⁸	
4-Methyl-1-butylcyclohexene-1 		196.3 to 197.1 ⁹⁸	0.818 ⁹⁸ D ₂₀ ²⁰	1.4558 ⁹⁸	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
4-Methyl-2-butyl- cyclohexene-1 		195.2 to 195.7 ⁹⁸	0.820 ⁹⁸ D ₂₀ ²⁰	1.4574 ⁹⁸	
4-Methyl-2-(2-methyl- propyl)-cyclohexene-1 		184.1 to 186.2 ⁹⁸	0.812 ⁹⁸ D ₂₀ ²⁰	1.4530 ⁹⁸	
1,5-Dimethyl-2-iso- propylcyclohexene-1 		180 to 183 ⁷⁷ @ 763mm 184 to 186 ⁷⁷ @ 767mm 68 to 74 ⁷⁷ @ 10mm	0.8550 ⁷⁷ @ 25°	1.4585 ⁷⁷ @ 25° 1.4600 ⁷⁷ @ 25° 1.4578 ⁷⁷ @ 17°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,5-Dimethyl-2-isopropylcyclohexene-1 or -6 		185 to 187 ¹²⁸ @ 764mm 186 to 187 ¹¹⁰	0.8215 ¹¹⁰ @ 23° 0.8432 ¹²⁸ D ₄ ⁰	1.4579 ¹¹⁰ @ 23°	
C₁₂H₂₂ 1-Methyl-2-pentyl- cyclohexene-1 		218.9 to 219.7 ⁹⁸	0.834 ⁹⁸ D ₂₀ ²⁰	1.4646 ⁹⁸	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
4-Methyl-2-(3-methylbutyl)-cyclohexene-1 or 3-Methyl-1-(3-methylbutyl)-cyclohexene-1		209 to 211 ⁸⁶	0.8190 ⁸⁶ 0.8301 ⁸⁶ @ 0°	1.459 ⁸⁶	
 or 					
4-Methyl-1-(3-methylbutyl)-cyclohexene-1		210 ^{82,87}	0.8213 ^{82,87} @ 16° 0.8333 ^{82,87} @ 0°	1.458 ^{82,87} @ 16°	
4-Methyl-2-ethyl-1-isopropylcyclohexene-1		90 to 92 ⁷⁷ @ 21mm 73 to 75 ⁷⁷ @ 10mm	0.8302 ⁷⁷ @ 25°	1.4614 ⁷⁷ @ 25° 1.4610 ⁷⁷ @ 25°	$[\alpha]_D^{18} = +39.18^\circ$ ⁷⁷


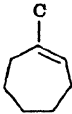
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2,4-Trimethyl-4-isopropylcyclohexene-1 		93 to 95 ⁷⁸ @ 20mm	0.84231 ⁷⁸ @ 25° 0.860 ⁷⁸ @ 0°	1.46635 ⁷⁸ @ 25° 1.46363 ⁷⁸ n _{H_a} ²⁵ 1.47299 ⁷⁸ n _{H_β} ²⁵ 1.47856 ⁷⁸ n _{H_γ} ²⁵	
C₁₃H₂₄ 4-Methyl-2-propyl-1-isopropylcyclohexene-1 		100 to 103 ⁷⁷ @ 18mm	0.8348 ⁷⁷ @ 25°	1.4605 ⁷⁷ @ 25°	[α] _D ¹⁸ = +35.90° ⁷⁷

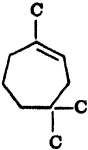
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
4-(1,1,3,3-Tetramethyl- butyl)-cyclohexene-1 		113 ⁷³ @ 12mm	0.8565 ⁷³ @ 25°	1.4741 ⁷³ @ 25°	
1,3,3,5,5-Pentamethyl- 4-isopropylcyclo- hexene-1 		122 to 123 ⁶⁷ @ 29mm	0.8696 ⁶⁷ @ 17° 0.8799 ⁶⁷ @ 0°	1.48767 ⁶⁷ @ 17°	

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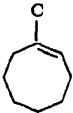
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Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cycloheptene (Suberene) 		115 114.5 to 115 ¹⁰ @ 774mm 115 ¹³ 114.5 to 115 ^{5,6} 114 to 115 ¹² 113 to 115 ⁷ 113 to 115 ⁸ @ 752mm 112 to 114 ⁹ @ 720mm	0.8253 0.7884 ¹⁰ @ 62.1° 0.7885 ¹⁰ @ 62.0° 0.8052 ¹⁰ @ 42.1° 0.8059 ¹⁰ @ 41.4° 0.8228 ⁷ 0.823 ⁴ 0.8239 ⁸ 0.8254 ⁹ 0.8255 ¹⁰ 0.8245 ^{5,6} D_{20}^{20} 0.814 ⁹ @ 19° 0.8272 ¹⁰ @ 17.9° 0.8359 ^{1,3} $D_{13.5}^{13.5}$ 0.8407 ^{5,6} D_0^0	1.457, 1.45301 ⁴ 1.4545 ⁸ 1.4552 ⁷ 1.45737 ¹⁰ 1.4585 ⁹ 1.4512 ⁹ @ 19° 1.4607 ^{1,3} @ 13.5° 1.45450 ¹⁰ $n_{H_a}^{20,0}$ 1.46438 ¹⁰ $n_{H_\beta}^{20,0}$ 1.46966 ¹⁰ $n_{H_\gamma}^{20,0}$	$\frac{dD}{dt} = -0.00088_4/^\circ\text{C.}$ (0° to 65°) $\frac{dn}{dt} = -0.0005_1/^\circ\text{C.}$ (13° to 20°)
C₈H₁₄ 1-Methylcycloheptene-1 		138 137.5 to 138.5 ¹¹ 137 to 138 ² 133 to 135 ⁹ @ 720mm 74 to 75 ⁹ @ 100mm	0.826₂ 0.8243 ⁹ @ 22° 0.824 ¹¹ @ 19.5° 0.8294 ² @ 15° 0.8350 ^{1,3} $D_{13.5}^{13.5}$	1.458₀ 1.4575 ⁹ @ 22° 1.4581 ¹¹ @ 19.5° 1.4581 ² @ 15° 1.4604 ^{1,3} @ 13.5°	$\frac{dD}{dt} = -0.0010_4/^\circ\text{C.}$ (10° to 25°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,4,4-Trimethyl- cycloheptene-1 (Eucarvene) 		161 to 165 ° @ 720mm	0.8185 °	1.4561 °	

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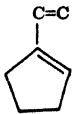
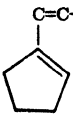
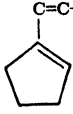
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclooctene 		145 to 146 ° 143 to 144 ° 145 ° @ 730mm 140 to 142 ° @ 720mm	0.8415 ° 0.855 ° 0.8486 ° @ 19° 0.8487 ° @ 17° 0.8497 ° D _{13.5} ^{18.5} 0.871 ° @ 0°	1.468, 1.4678 ° 1.4736 ° 1.4739 ° 1.4683 ° @ 17° 1.4700 ° @ 13.5° 1.4787 ° n _{H_eb} ^{18.5} 1.4767 ° n _{H_ebo} ^{18.5} 1.4759 ° n _{H_eo} ^{18.5} 1.4670 ° n _{H_er} ^{18.5} 1.4814 ° n _{H_ew} ^{18.5} 1.4703 ° n _{H_ey} ^{18.5}	
C₈H₁₆ 1-Methylcyclooctene-1 		158 to 160 ° 165 to 169 ° @ 730mm	0.8487 ° 0.8515 ° @ 15° 0.8525 ° D _{12.5} ^{13.5}	1.4691 ° 1.4673 ° @ 15° 1.4720 ° @ 13.5°	

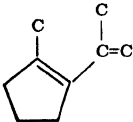
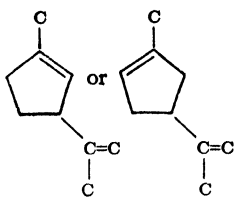
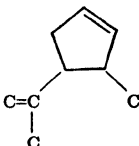
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclopentadecene	36 to 37 °	122 to 123 ° @ 1.2mm	0.8416 ° @ 68.5° 0.8429 ° @ 66.5°	1.4728 ° n _{H_eb} ⁶⁹ 1.4791 ° n _{H_eb} ^{52.4} 1.4710 ° n _{H_eb} ⁶⁹ 1.4703 ° n _{H_eg} ⁶⁹ 1.4765 ° n _{H_eg} ^{52.4} 1.4620 ° n _{H_er} ⁶⁹ 1.4682 ° n _{H_er} ^{52.4} 1.4753 ° n _{H_ev} ⁶⁹ 1.4816 ° n _{H_ev} ^{52.4} 1.4651 ° n _{H_eu} ⁶⁹ 1.4713 ° n _{H_eu} ^{52.4}	
C₁₆H₃₀ 1-Methylcyclopentadecene-1		152 to 153 ° @ 12mm	0.8697 ° @ 22°	1.4853 ° @ 22°	

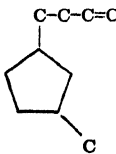
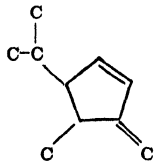
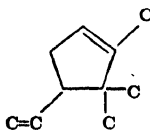
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methylcyclopentadecene-2 or -3 (Muscene)		120 @ 1mm ⁴			[α] _D = -8.8° ⁴
C₁₇H₃₄ Cycloheptadecene (Civetene)	47 ⁸	115 ⁸ @ 0.3mm			

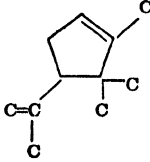
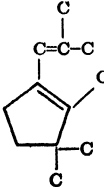
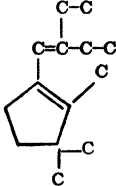
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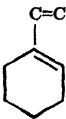
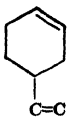
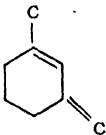
2. CYCLENES WITH AN ALKENYL OR OLEFIN SUBSTITUTION, C_nH_{2n-4}

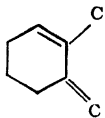
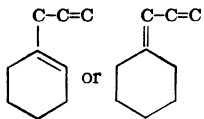
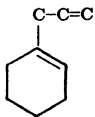
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Ethenylcyclopentene-1 		114 to 115 °° @ 754mm	0.824 °° @ 18°	1.4870 °° @ 18°	
C₈H₁₂ 1-Propen-1-ylcyclopentene-1 		142 to 144 °° @ 754mm	0.835 °° @ 21°	1.4865 °°	
C₉H₁₄ 1-Buten-1-ylcyclopentene-1 		59 to 62 °° @ 14mm	0.833 °° @ 19°	1.4850 °° @ 19°	

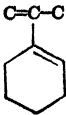
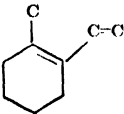
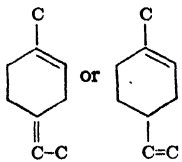
<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
1-Methyl-2-isopropenylcyclopentene-1 		155 to 157 ³⁴	0.8515 ³⁴	1.4892 ³⁴	
1-Methyl-3-isopropenylcyclopentene-1 or -5 		150 ³⁶			
3-Methyl-4-isopropenylcyclopentene-1 		143 to 145 ³⁶ @ 770mm			

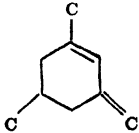
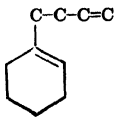
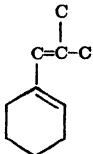
Name and Carbon Skeleton	M. P., °C	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Methyl-1-buten-3-ylcyclopentene-x 		168 to 169 ²¹	0.8377 ²¹ @ 18.5°	1.4665 ²¹ @ 18.5°	
d-3-Methylene-4-methyl-5-isopropylcyclopentene-1 		169 to 173 ⁸⁰ 50 to 54 ⁸⁰ @ 10mm		1.470 ⁸⁰	
2,3,3-Trimethyl-4-ethenylcyclopentene-1 		157 to 158 ¹²			

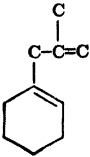
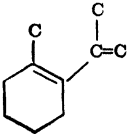
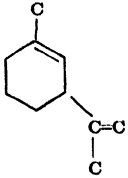
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,3,3-Trimethyl-4-isopropenylcyclopentene-1 		177 to 179 ⁸⁷ @ 754mm			
C₁₂H₂₀ 2-Methyl-1-(2,3,3-trimethylcyclopenten-1-yl)-propene-1 		188 to 190 ¹¹	0.8311 ¹¹ @ 16° 0.8421 ¹¹ @ 0°	1.46707 ¹¹ @ 16°	
C₁₄H₂₄ 2-Ethyl-1-(2,3,3-trimethylcyclopenten-1-yl)-butene-1 		222 to 224 ¹¹	0.8688 ¹¹ @ 19° 0.8814 ¹¹ @ 0°	1.46875 ¹¹	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Ethenylcyclohexene-1 		145 ¹⁸ 143 to 145 ⁴³ 36 @ 23mm ³³	0.8701 ⁴³ D ₀ ²⁰ 0.8523 ³³ @ 16° 0.8862 ⁴³ D ₀ ⁰	1.49060 ⁴³ 1.4677 ³³ @ 16° 1.46423 ³³ n _{H_a} ¹⁵ 1.48812 ³³ n _{H_β} ¹⁶	
4-Ethenylcyclohexene-1 		130 ⁵² @ 773mm 129.5 to 130.5 ⁵³ 65 to 66 ⁵³ @ 100mm 50 @ 50mm ⁵²	0.8310 ⁵² 0.8320 ⁵³ 0.8484 ⁵³ @ 0°	1.46529 ⁵³ @ 20.1° 1.46380 ⁵²	$\frac{dD}{dt} = -0.0008_8/^\circ\text{C.}$ (0° to 20°)
3-Methylene-1-methylcyclohexene-1 		134 to 138 ⁵	0.8389 ⁵ @ 18.8°	1.48723 ⁵ 1.48274 ⁵ n _{H_a} ¹⁷ 1.49872 ⁵ n _{H_β} ¹⁷ 1.50910 ⁵ n _{H_γ} ¹⁷	


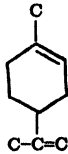
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Methylene-2-methyl-cyclohexene-1 		135.5 ³⁵	0.8521 ³⁵	1.4925 ³⁵	
C₉H₁₄ 1-Cyclohexen-1-yl-propene-2 or 1-Cyclohexylidene-propene-2 		159 to 161 ⁷⁷	0.8457 ⁷⁷ 0.8468 ⁷⁷ D ₂₀ ²⁰ 0.8611 ⁷⁷ @ 0°		
1-Propen-2-ylcyclohexene-1 		158 to 159 ⁵⁴ @ 755mm	0.8426 ⁵⁴	1.477 ⁵⁴	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Isopropenylcyclohexene-1 		161 to 162 ⁶⁴			
1-Methyl-2-ethenylcyclohexene-1 		156 to 157 ¹⁸			
1-Methyl-4-ethylidene- cyclohexene-1 or 1-Methyl-4-ethenyl- cyclohexene-1 		160 to 163 ¹⁰⁰	0.843 ¹⁰⁰ @ 22°	1.47586 ¹⁰⁰ @ 22°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,5-Dimethyl-3-methylenecyclohexene-1 		61 to 66 ° @ 37mm 54 to 56 ° @ 25mm	0.8280 ° @ 20.1° 0.8300 ° @ 17.1°	1.4809 ° @ 20.2° 1.48151 °, ^s 1.47653 ° <i>n</i> _{H_A} ^{20,2} 1.49168 ° <i>n</i> _{H_β} ^{20,2} 1.50159 ° <i>n</i> _{H_γ} ^{20,2}	
C₁₀H₁₆ 1-Buten-3-ylcyclohexene-1 		60 to 62 ° ⁴⁵ @ 10mm	0.8445 ° ⁴⁵ @ 18°	1.4745 ° ⁴⁵ @ 18°	
2-Methyl-1-cyclohexen-1-ylpropene-1 		172 to 173 ° ³⁵ 88 to 90 ° ³⁵ @ 13mm	0.8537 ° ³⁵	1.4854 ° ³⁵	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-1-cyclohexen-1-ylpropene-2 			0.8607 ³⁵	1.4797 ²⁵	
1-Methyl-2-isopropenylcyclohexene-1 (o-Menthadiene) 		177 ⁴⁴ @ 755mm			
d-1-Methyl-3-isopropenylcyclohexene-1 (Sylvestrene, carvestrene) 		176 to 177 ⁹⁴ 175 to 178 ^{37, 93} 175 to 176 ⁹⁹ 173 to 175 ³	0.8470 ⁹⁴ 0.848 ⁹⁹ 0.8485 ³⁷ @ 18° 0.8510 ⁹⁴ @ 16° 0.8612 ³ @ 16°	1.4752 ³⁷ 1.47573 ⁹⁹ 1.47799 ⁹⁴ @ 18° 1.47468 ⁹⁴ n _D ¹⁸ _a	[α] _D = +19.5° ³ [α] _D = +67.5° ³⁷ [α] _D ¹⁰ = +66.32° ⁹⁹

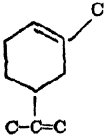
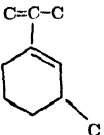
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<i>l</i>-1-Methyl-3-isopropenylcyclohexene-1		176 to 178 ³⁷	0.848 ³⁷ @ 19°	1.4761 ³³	[α] _D = -68.2° ³⁷
<i>dl</i>-1-Methyl-3-isopropenylcyclohexene-1		177 to 179 ⁷ @ 769mm	0.8453 ¹ 0.8486 ⁷ @ 17.2°	1.47506 ¹ 1.47717 ⁷ @ 17.2°	
		177.2 to 178.2 ⁷ @ 767.5mm		1.47380 ⁷ n _{H_a} ^{17.2}	
		176 to 177.5 ⁷ @ 764mm		1.48505 ⁷ n _{H_β} ^{17.2}	
		179 ²⁴		1.49245 ⁷ n _{H_γ} ^{17.2}	
		178 ¹⁰			
		175 to 180 ³			
		174 to 177.5 ¹			
		173 to 175 ⁹²			
		178 to 179 ⁶⁶ @ 750mm			

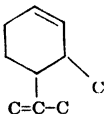
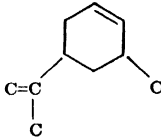
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-isopropylidenecyclohexene-1 <p>(<i>p</i>-Menthadiene) (Terpinolene)</p> 		186 ⁴⁰ @ 764mm 185 to 190 ⁸⁸ 184 to 188 ⁴⁶ 184 to 187 ¹⁵ 183 to 185 ⁸³ 181 to 185 ⁸⁸ 121 ⁸³ @ 112mm 75 @ 15mm ⁴⁰ 72 @ 10mm ⁴⁰ 67 to 68 ⁸³ @ 10mm	0.854 ⁸³ 0.857 ⁴⁶ 0.8583 ¹⁵ 0.8633 ⁴⁰ D ₁₅ ¹⁵	1.48017 ¹⁵ 1.484 ⁸³	
<i>d</i>-1-Methyl-4-isopropenylcyclohexene-1 <p>(<i>p</i>-Menthadiene) (<i>d</i>-Limonene)</p> 	-96.6 ⁸⁵	180 to 182 ⁴ @ 765mm 175.5 to 176 ¹⁴ @ 763mm 179.5 to 180.5 ⁴ 178 to 179 ⁸⁰ 178 ⁸⁵ 177.6 to 178.0 ⁷ 176 to 177.4 ¹⁷ 176 to 177 ¹⁷ 176 to 176.7 ¹⁷ 176 to 176.4 ¹³ 176 ⁶² 175 to 177 ⁹¹ 175 ⁸³ 174 to 176 ⁴²	0.7135 ⁷⁹ @ 176.5° 0.8356 ¹⁷ @ 30° 0.8417 ²⁷ @ 25° 0.8409 ⁸⁹ @ 25° 0.8437 ⁸⁰ D ₃₅ ³⁵ 0.8402 ¹⁴ @ 21° 0.8425 ³⁰ 0.8456 ⁴⁹ 0.846 ⁶² 0.8441 ⁸⁰ D ₂₀ ²⁰ 0.8425 ⁷ @ 19.6°	1.4681 ¹⁷ @ 30° 1.4720 ²⁷ @ 25° 1.4725 ⁶⁹ @ 25° 1.47428 ¹⁴ @ 21° 1.4727 ⁷ @ 19.6° 1.473 ⁷³ @ 17° 1.4771 ⁴² @ 14° 1.49116 ⁴ @ 13.4° 1.47124 ¹⁴ n _D ²¹ _H ^a	[α] _D ⁸⁰ = +100.2° ¹⁷ † [α] _D ²⁰ = +126.84° ¹³ [α] _D ³⁰ = +122.47° ²⁷ [α] _D ^{19.5} = +104.25° ¹⁴ [α] _D = +124° ⁷³ [α] _D = +123.6° ²⁶ [α] _D = +122.7° ²⁷ [α] _D = +120.466° ⁴⁹ †Average of several experimental values.

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
d-1-Methyl-4-iso-propenylcyclohexene-1 (Continued)		177.5 ³⁰ @ 759mm	0.8464 ⁴ @ 18°	1.48342 ⁴ n _{H_a} ¹⁹	
		177.6 to 177.8 ⁷³ @ 755mm	0.8532 ⁶⁰ @ 15.6°	1.47489 ⁷ n _{H_a} ^{14,7}	
		176.5 ⁷⁹ @ 753.7mm	0.8498 ⁶⁰ D ₁₅ ¹⁵	1.48658 ⁴ n _{H_a} ^{13,4}	
		177 ³⁰ @ 745mm	0.8468 ⁷ @ 14.7°	1.48223 ¹⁴ n _{H_β} ²¹	
		71 @ 20mm ⁵⁹	0.8532 ⁶⁰ D ₁₀ ¹⁰	1.49796 ⁴ n _{H_β} ¹⁹	
		64.4 ⁷³ @ 15mm	0.8530 ⁷⁹ @ 9.8°	1.48277 ⁷ n _{H_β} ^{14,7}	
			0.8576 ⁶⁰ D ₄ ⁴	1.50109 ⁴ n _{H_β} ^{13,4}	
			0.8584 ³⁰ @ 0°	1.48886 ¹⁴ n _{H_γ} ²¹	
			0.8585 ³⁰ D ₀ ⁰	1.50739 ⁴ n _{H_γ} ¹⁹	
				1.49062 ⁷ n _{H_γ} ^{14,7}	
				1.51031 ⁴ n _{H_γ} ^{13,4}	

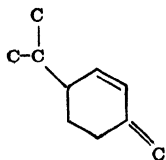
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<i>l</i>-1-Methyl-4-isopropenylcyclohexene-1 (<i>l</i> -Limonene)		175.5 to 176.5 ¹⁴ @ 763mm 176 to 176.4 ¹³ 175.5 to 177 ⁵³ 175 to 176 ⁹⁵ 177.6 to 177.8 ⁶⁶ @ 755mm 64.4 ⁷³ @ 15mm	0.8453 ⁶⁰ D_{25}^{25} 0.8417 ⁷³ @ 20.6° 0.8407 ¹⁴ @ 20.5° 0.8422 ¹³ 0.846 ⁹⁵ 0.8483 ⁶⁰ D_{20}^{20} 0.8514 ⁶⁰ D_{15}^{15} 0.8472 ⁷³ @ 14° 0.8549 ⁶⁰ D_{10}^{10}	1.47468 ¹⁴ @ 20.5° 1.47459 ⁹⁵ 1.4727 ⁷³ @ 17.2° 1.4740 ⁷³ @ 14° 1.47157 ¹⁴ $n_{H_a}^{20,6}$ 1.48256 ¹⁴ $n_{H_\beta}^{20,6}$ 1.48924 ¹⁴ $n_{H_\gamma}^{20,6}$	$[\alpha]_D^{20} = -122.6^\circ$ ¹³ $[\alpha]_D^{19.5} = -101.5^\circ$ ¹⁴ $[\alpha]_D^{18} = -121^\circ$ ⁷³ $[\alpha]_D = -103.51^\circ$ ⁶⁰
<i>dl</i>-1-Methyl-4-isopropenylcyclohexene-1 (<i>dl</i> -Limonene) (Dipentene)		175.5 to 176.5 ¹⁴ @ 763mm 180 to 182 ⁹³ 180 to 181 ⁴⁵ 178 to 180 ⁹ 178 ^{73,94} 177 ⁸⁶ 176 to 178 ¹⁹ 175 to 178 ⁸⁹ 175 to 176 ²⁷ 174 to 175 ⁴⁶ 64.4 ¹⁴ @ 15mm	0.7962 ²² @ 78.3° 0.8486 ⁴⁵ D_{25}^{25} 0.8402 ¹⁴ @ 20.85° 0.844 ²⁷ 0.845 ^{46,86,94} 0.8535 ¹⁹ 0.8450 ²² @ 16.6° 0.8548 ⁴⁵ D_{15}^{15} 0.85457 ⁴⁵ @ 14.4°	1.47443 ¹⁴ @ 20.85° 1.47194 ²⁷ 1.4746 ⁴⁶ 1.47644 ⁹⁴ 1.4727 ⁷³ @ 18° 1.48013 ¹⁹ @ 16° 1.44279 ²² $n_{H_a}^{78,3}$ 1.47134 ¹⁴ $n_{H_a}^{20,85}$ 1.47308 ⁹⁴ $n_{H_a}^{20}$	

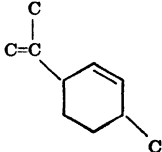

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
dl-1-Methyl-4-isopropenylcyclohexene-1 (Continued)			0.8627 ⁴⁸ D_4^* 0.8657 ¹⁹ @ 0°	1.47172 ²² $n_{H_a}^{16.6}$ 1.47056 ⁴⁵ $n_{H_a}^{14.4}$ 1.45328 ²² $n_{H_\beta}^{19.3}$ 1.48231 ¹⁴ $n_{H_\beta}^{20.85}$ 1.48291 ²² $n_{H_\beta}^{16.6}$ 1.48629 ⁴⁵ $n_{H_\beta}^{14.4}$ 1.45965 ²² $n_{H_\gamma}^{18.3}$ 1.48898 ¹⁴ $n_{H_\gamma}^{20.85}$ 1.48961 ²² $n_{H_\gamma}^{16.6}$ 1.49367 ⁴⁵ $n_{H_\gamma}^{14.4}$	
2-Methyl-3-isopropenylcyclohexene-1 (o-Menthadiene-1,8a) <div> </div>		170 to 171 ⁶² @ 765mm	0.8481 ⁶² D_{20}^{20}	1.4758 ⁶²	


Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-4-iso-propenylcyclohexene-1 (<i>m</i> -Menthadiene-1,8a, Isocarvestrene, Diprene) 		176 to 177 ²⁴ @ 765mm 171.5 to 173 ² @ 752mm 68.5 to 69 ² @ 16mm	0.8481 ^{2,24} 0.8476 ² 0.8496 ²⁴ D ₂₀ ²⁰	1.49660 ² @ 23.4° 1.46946 ² 1.47799 ²⁴ 1.49090 ²⁴ 1.49893 ²⁴	
<i>d</i>-3-Methyl-1-iso-propenylcyclohexene-1 (<i>m</i> -Menthadiene) 		181 ³⁸ @ 736mm 179 ⁵⁶ @ 730mm	0.864 ³⁸ D ₁₇ ¹⁷	1.4946 ^{38,56}	[α] _D = +17.5° ⁵⁶ [α] _D = +64.0° ³⁸
<i>l</i>-3-Methyl-1-isopropenylcyclohexene-1		181 to 182 ⁵⁶		1.4972 ⁵⁶	[α] _D = -12.9° ⁵⁶

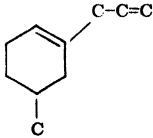
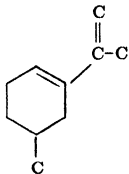
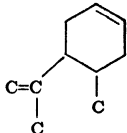
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
dl-3-Methyl-1-isopropenylcyclohexene-1		182 to 183 ³⁸ @ 770mm 187 ⁴⁵ @ 765mm 181 to 182 ⁶⁶ 184 ²⁹ @ 745mm	0.8549 ²⁹ @ 22° 0.8609 ⁵⁶ D ₂₀ ²⁰ 0.8624 ³⁸ D ₂₀ ²⁰	1.5015 ²⁹ @ 25° 1.4975 ⁶⁶ 1.5030 ³⁸	
3-Methyl-4-isopropenylcyclohexene-1 (<i>o</i> -Menthadiene)		170 to 171 ⁶² @ 765mm	0.8490 ⁶² D ₁₇ ¹⁷	1.4778 ⁶²	
					
d-3-Methyl-5-isopropenylcyclohexene-1		175 to 176 ⁶¹			[α] _D ¹⁷ = +29.6° ⁶¹
					

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
l-3-Methyl-5-iso-propenylcyclohexene-1		175 to 176 ⁶¹			$[\alpha]_D^{16} = -25.3^\circ$ ⁶¹
dl-3-Methyl-5-iso-propenylcyclohexene-1		175 to 176 ⁶¹ @ 765mm			
3-Methylene-6-iso-propylcyclohexene-1 (<i>p</i> -Menthadiene, <i>β</i> -Phellandrene)		171 to 172 ⁶⁹ @ 766mm 171 to 172 ²⁵ 57 @ 11mm ²⁵	0.8520 ²⁵ 0.8558 ⁶⁹ @ 10°	1.4788 ²⁵	$[\alpha]_D = +18.54^\circ$ ²⁵ $[\alpha]_D = +17.60^\circ$ ⁶⁹

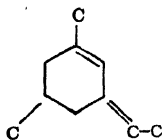


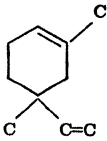
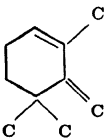
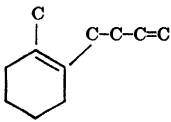
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<i>d</i>-3-Methyl-6-isopropenylcyclohexene-1 <p>(<i>p</i>-Menthadiene)</p> 		172 to 174 ⁸⁸ 171 to 173 ²⁰ @ 750mm	0.838 ²⁰ @ 22.5° 0.8382 ⁸⁸ @ 20.5°	1.4692 ²⁰ @ 22.5° 1.4697 ⁸⁸ @ 20.5° 1.4659 ²⁰ $n_{H_a}^{22.5}$ 1.4775 ²⁰ $n_{H_\beta}^{22.5}$	$[\alpha]_D^{20} = +131.93^\circ$ ⁸⁸ $[\alpha]_{578}^{20} = +133.50^\circ$ ²⁰ $[\alpha]_{540}^{20} = +153.4^\circ$ ¹⁷
<i>l</i>-3-Methyl-6-isopropenylcyclohexene-1		172.5 to 173.5 ⁸⁷ 172 to 172.5 ⁷⁰ @ 745mm	0.8370 ⁷⁰ 0.8390 ⁷⁰ @ 19.5°	1.47043 ⁸⁷ 1.47643 ⁷⁰ 1.4750 ⁷⁰ @ 19.5°	$[\alpha]_D = -140.58^\circ$ ⁸⁷ $[\alpha]_D = -5.92^\circ$ ⁷⁰
4-Methylene-1-isopropylcyclohexene-1 <p>(<i>p</i>-Menthadiene, β-Terpinene)</p> 		173 to 174 ⁹⁷	0.838 ⁹⁷ @ 22° 0.840 ⁹⁷ @ 22°	1.4754 ⁹⁷ @ 22° 1.4751 ⁹⁷ @ 22°	

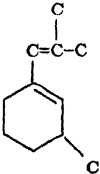
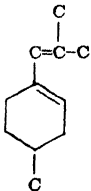
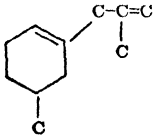
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
d-4-Methyl-1-iso-propenylcyclohexene-1 <p>(p-Menthadiene)</p> 		184 to 185 ^{16, 69} @ 776mm 174 to 177 ⁸² 184 ⁴⁵ @ 756mm 183 to 185.5 ²⁸ @ 755mm 182 to 184 ²⁰ @ 750mm 182 to 183 ⁴⁵ @ 748mm 76 @ 14mm ²⁸ 69 @ 14mm ³² 62 to 65 ⁸² @ 14mm	0.8574 ⁴⁵ D ₂₅ ²⁵ 0.8679 ²⁸ @ 24° 0.8420 ⁸² 0.851 ²⁰ 0.858 ⁶⁸ 0.8649 ¹⁶ D ₁₆ ¹⁶ 0.8634 ⁴⁵ D ₁₅ ¹⁵ 0.8585 ³² @ 14.2° 0.86483 ⁴⁵ @ 12.7° 0.8712 ⁴⁵ @ 4°	1.4957 ²⁸ @ 24° 1.48422 ⁸² 1.4965 ¹⁶ 1.4915 ⁶⁸ 1.4876 ²⁰ @ 19.8° 1.4966 ³² @ 14.2°	[α] _D = +100° ¹⁶ [α] _D ²⁰ = +118.33° ²⁰ [α] _D ¹⁶ = +98.2° ⁴⁵ [α] _D ^{14.2} = +140.6° ²²
dl-4-Methyl-1-iso-propenylcyclohexene-1		184 to 185 ⁴⁵	0.83579 ⁴⁵ D ₂₀ ²⁰ 0.8390 ⁴⁵ D ₁₅ ¹⁵ 0.8425 ⁴⁵ D ₁₀ ¹⁰	1.46945 ⁴⁵ n _{H_a} ^{17.2} 1.48113 ⁴⁵ n _{H_β} ^{17.2} 1.48824 ⁴⁵ n _{H_γ} ^{17.2}	


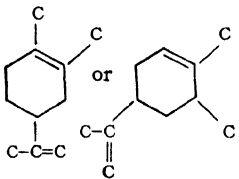
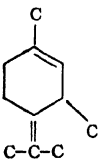
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
d-4-Methyl-2-propen-2-ylcyclohexene-1 <i>(o-Menthadiene)</i> 		171 to 173 ⁷⁸	0.8361 ⁷⁸		$[\alpha]_D = +52.84^\circ$ ⁷⁸
d-4-Methyl-2-isopropenylcyclohexene-1 		187 ⁶⁵ @ 765mm 181 to 182 ⁶⁶ 179 ⁶⁷ @ 730mm	0.8609 ⁶⁶ D_{30}^{20}	1.4972 ⁶⁷ 1.4975 ⁶⁶	$[\alpha]_D = +17.5^\circ$ ⁶⁷
cis-4-Methyl-5-isopropenylcyclohexene-1 		169 to 170 ⁶³ @ 762mm	0.8507 ⁶³ D_{20}^{20}	1.4825 ⁶³	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
trans-4-Methyl-5-isopropenylcyclohexene-1		170 ⁶³	0.8477 ⁶³ D ₂₀ ²⁰	1.4749 ⁶³	
1,5-Dimethyl-3-ethyldenecyclohexene-1		175 to 178 ⁶ @ 753mm	0.8360 ^{6,74} @ 21.3° 0.8332 ⁶ 0.8516 ⁷⁴	1.4868 ⁶ @ 19.9° 1.48092 ⁶ @ 17.7° 1.48255 ⁶ n _{H_a} ^{19.9} 1.47701 ⁶ n _{H_a} ^{17.7} 1.49748 ⁶ n _{H_β} ^{19.9} 1.49070 ⁶ n _{H_β} ^{17.7} 1.50720 ⁶ n _{H_γ} ^{19.9} 1.49930 ⁶ n _{H_γ} ^{17.7}	

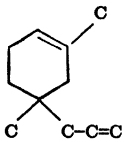
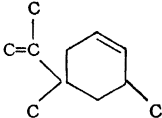
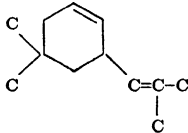


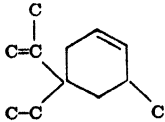
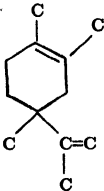
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
2,4-Dimethyl-4-ethenylcyclohexene-1 		160 to 161 ⁵¹ 44 @ 9 mm ⁵¹	0.8331 ⁵¹ D_0^{20} 0.8481 ⁵¹ D_0^0	1.46581 ⁵¹ @ 19.7° 1.46230 ⁵¹ $n_{H_a}^{19.7}$ 1.47204 ⁵¹ $n_{H_\beta}^{19.7}$ 1.47964 ⁵¹ $n_{H_\gamma}^{19.7}$	
2,4,4-Trimethyl-3-methylenecyclohexene-1 		48.5 to 49 ⁵⁰ @ 11mm	0.843 ⁵⁰ @ 21°	1.4772 ⁵⁰ @ 21°	
C₁₁H₁₈ 1-Methyl-2-buten-3-ylcyclohexene-1 		75 to 78 ⁴¹ @ 10mm	0.8769 ⁴¹ @ 15.5°	1.4853 ⁴¹ @ 15.5°	

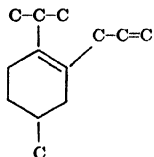
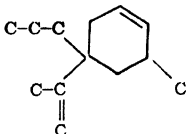
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
d-2-Methyl-1-(3-methyl-cyclohexen-1-yl)-propene-1 		192 to 193 ³⁵	0.8531 ³⁵ @ 15°	1.4802 ³⁵ @ 15°	[α] _D = +54.8° ³⁵
d-2-Methyl-1-(4-methyl-cyclohexen-1-yl)-propene-1 		190 to 191 ³⁵	0.8445 ³⁵ @ 15°	1.4793 ³⁵	[α] _D = +63.9° ³⁵
4-Methyl-2-(2-methyl-propen-2-yl)-cyclohexene-1 		191 to 192 ³⁵	0.846 ³⁵ @ 15°	1.4768 ³⁵	[α] _D = +68.8° ³⁵

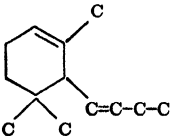
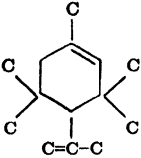
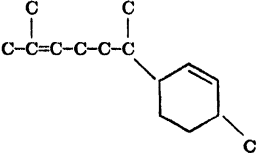
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Ethyl-4-isopropenyl-cyclohexene-1 		201 to 202 ⁹⁶	0.8545 ⁹⁶ @ 18°	1.4802 ⁹⁶ @ 18°	
1,2-Dimethyl-4-isopropenyl-cyclohexene-1 or 2,3-Dimethyl-5-isopropenyl-cyclohexene-1 		72 @ 9mm ⁷⁴	0.8576 ⁷⁴	1.46502 ⁷⁴	$[\alpha]_D^{20} = -55.44^\circ$ ⁷⁴ $[\alpha]_D^{20} = -47.55^\circ$ ⁷⁴
1,3-Dimethyl-4-isopropylidene-cyclohexene-1 		71 to 73 ⁷⁵ @ 16mm	0.8402 ⁷⁵	1.47252 ⁷⁵	$[\alpha]_D^{20} = -96.89^\circ$ ⁷⁵ $[\alpha]_D^{20} = -81.41^\circ$ ⁷⁵

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,5-Dimethyl-3-isopropylidene-cyclohexene-1 		191 to 196 ° 106 to 109 ° @ 46mm 99 to 103 ° @ 36mm	0.8561 ° @ 23.6° 0.8465 ° @ 22.4° 0.8395 ° @ 21.4° 0.8448 ° @ 19.0°	1.49367 ° @ 23.2° 1.49519 ° @ 22.5° 1.48521 ° @ 19.1° 1.48559 ° @ 18.0° 1.48938 ° n _{H_a} ^{23.2} 1.49072 ° n _{H_a} ^{22.6} 1.48119 ° n _{H_a} ^{19.1} 1.48168 ° n _{H_a} ^{19.0} 1.50466 ° n _{H_β} ^{23.2} 1.50674 ° n _{H_β} ^{22.6} 1.49516 ° n _{H_β} ^{19.1} 1.49564 ° n _{H_β} ^{18.0} 1.51473 ° n _{H_γ} ^{23.2} 1.51716 ° n _{H_γ} ^{22.6} 1.50412 ° n _{H_γ} ^{19.1} 1.50450 ° n _{H_γ} ^{18.0}	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,4-Dimethyl-4-propen-2-ylcyclohexene-1 		182 to 185 ⁸⁴ 183 to 185 ⁸¹ @ 741mm 67 to 69 ⁸¹ @ 9mm	0.8415 ⁸⁴ @ 16° 0.8450 ⁸¹ @ 9.9° 0.8525 ⁸¹ @ 0°	1.47292 ⁸⁴ @ 16° 1.47281 ⁸¹ @ 9.9°	
3,5-Dimethyl-5-isopropenyl-cyclohexene-1 		184 to 186 ⁷¹ @ 737mm	0.8585 ⁷¹ @ 25°	1.4845 ⁷¹ @ 25°	
C₁₂H₂₀ 5,5-Dimethyl-3-(2-methylpropen-1-yl)-cyclohexene-1 		195 to 196 ⁴⁸	0.8246 ⁴⁸ @ 23°	1.4653 ⁴⁸ @ 23°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Methyl-5-ethyl-5-isopropenylcyclohexene-1 		199 to 202 ⁷¹ @ 759mm 83 to 85 ⁷¹ @ 15mm	0.8631 ⁷¹ @ 25°	1.4854 ⁷¹ @ 25°	
1,2,4-Trimethyl-4-isopropenylcyclohexene-1 		202 to 203 ²⁸ @ 761mm 205 ⁷² 205 ⁵¹ @ 750mm 97 to 98 ⁷² @ 22mm 85 @ 13mm ⁵¹	0.85322 ⁷² @ 25° 0.8597 ⁵¹ @ 20° 0.8626 ²⁸ @ 16° 0.872 ⁷² @ 0° 0.8741 ⁵¹ @ 0°	1.47786 ⁷² @ 25° 1.48074 ⁵¹ @ 19.7° 1.4823 ²⁸ @ 16° 1.47463 ⁷² n _H ²⁰ _a 1.47716 ⁵¹ n _H ^{19.7} _a 1.48572 ⁷² n _H ²⁵ _β 1.48796 ⁵¹ n _H ^{19.7} _β 1.49241 ⁷² n _H ²⁵ _γ 1.49491 ⁵¹ n _H ^{19.7} _γ	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
x,x,2-Trimethyl-4-isopropenylcyclohexene-1 (Dimethyl diprene)		200.5 to 201.3 ° @ 758mm 87.8 to 88.3 ° @ 12mm	0.8535 °	1.47915 °	
C₁₃H₂₂ d-4-Methyl-2-propen-2-yl-1-isopropylcyclohexene-1		214 to 217 ° 97 to 100 ° @ 17mm	0.8551 °		[α] _D = +50.86° °
					
3-Methyl-5-n-propyl-5-isopropenylcyclohexene-1		104 to 106 ° @ 14mm	0.8872 ° @ 25°	1.4865 ° @ 25°	
					

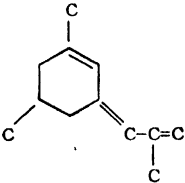
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,4,4-Trimethyl-3-buten-1-ylcyclohexene-1 		220 to 221 ⁴⁷ @ 747mm	0.8530 ⁴⁷	1.4784 ⁴⁷	
C₁₄H₂₄ 1,3,3,5,5-Pentamethyl-4-isopropenylcyclohexene-1 		122 to 123 ⁵⁸ @ 29mm	0.8696 ⁵⁸ @ 17° 0.8799 ⁵⁸ @ 0°	1.48767 ⁵⁸ @ 17°	
C₁₆H₂₆ 3-Methyl-6-(1,5-dimethylhexen-4-yl)-cyclohexene-1 (Dihydrozingiberene) 		135 to 136 ⁷⁶ @ 15mm 122 to 125 ⁸¹ @ 7mm	0.8557 ⁸¹ @ 20° 0.865 ⁷⁶ @ 15°	1.4837 ⁸¹ 1.4881 ⁷⁶	[α] _D = -37° ⁸¹

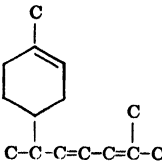
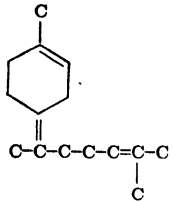
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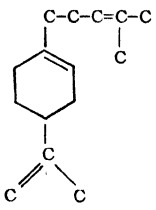
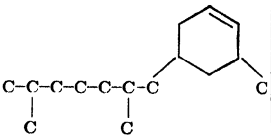
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3. CYCLENES WITH TWO ALKENYL OR ONE-ALKADIENYL SUBSTITUTIONS, C_nH_{2n-6}

 $C_{12}H_{18}$

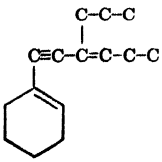
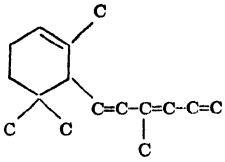
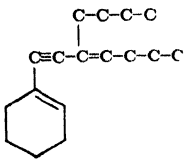
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,5-Dimethyl-3-(2-methylpropen-2-ylidene)-cyclohexene-1 		103 to 106 ° @ 17mm	0.8619 ° @ 22.2°	1.52159 ° @ 22.3° 1.51543 ° $n_{H_a}^{22.3}$ 1.53781 ° $n_{H_\beta}^{22.3}$ 1.55360 ° $n_{H_\gamma}^{22.3}$	
$C_{13}H_{18}$ 1,3,3-Trimethyl-2-butadienylcyclohexene-x		108 to 110 ° @ 15mm	0.8784 ° @ 18°	1.5320 ° @ 18°	
2,4,4-Trimethyl-3-butadien-x,x-yl-cyclohexene-x		96 to 97 ° @ 16.5mm	0.8675 ° @ 18°	1.5000 ° @ 18°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-(1,5-dimethylhexadien-2,4-yl)-cyclohexene-1 (Zingiberene) 		160 to 161 ¹³ @ 327mm 137 to 139 ¹⁰ @ 17mm 128 to 130 ¹¹ @ 12mm 128 to 129 ¹⁴ @ 9mm 119 to 123 ⁸ @ 3mm	0.8638 ⁸ D ₃₀ ³⁰ 0.8684 ¹⁴ 0.8731 ¹³ 0.874 ¹¹ @ 17° 0.8733 ¹⁰ @ 16°	1.4870 ⁸ @ 30° 1.49399 ¹³ 1.4956 ¹⁴ 1.4975 ¹¹ 1.4984 ¹⁰ @ 16° 1.49041 ¹³ n _{H_a} ²⁰ 1.50319 ¹³ n _{H_β} ²⁰ 1.51112 ¹³ n _{H_γ} ²⁰	[α] _D ³⁰ = -64.0° ⁸ [α] _D = -73.38° ¹³ [α] _D = -60° ¹⁰ [α] _D = -59.5° ¹¹
1-Methyl-4-(1,5-dimethylhexene-4-ylidene)-cyclohexene-1 (Bisabolene) 		262 to 263 ^{2,3} @ 756mm 261 to 262 ¹² @ 752mm 261 to 262 ⁵ @ 751mm 133 to 134 ¹⁵ @ 12mm 131 ⁸ @ 9mm	0.8717 ¹⁵ @ 21° 0.873 ⁸ 0.8798 ¹² 0.873 ⁵ @ 15° 0.8759 ⁵ @ 15°	1.4923 ¹⁵ @ 21° 1.4901 ⁸ 1.4935 ² 1.4910 ³ @ 19.5°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (at 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1-4-Isopropenyl-1-(4-methylpenten-3-yl)-cyclohexene-1 (Cycloisopropenemyrcene) 		242 to 244 ° 136 to 139 ° @ 14mm 136 @ 11mm °	0.8817 ° @ 19° 0.905 °	1.4915 ° 1.4993 ° @ 19°	$[\alpha]_D = -10.59^\circ$ °
C₁₆H₂₆ 3-Methyl-5-(2,6-dimethylheptadien-x,x-yl)-cyclohexene-1 		143 to 144 ° @ 15mm	0.923 ° @ 18.5° 0.920 ° @ 16.5°	1.4988 ° @ 18.5° 1.5040 ° @ 16.5°	

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- (6) J. Kandel, Compt. rend. **205**, 994, 1937.
- (7) E. Knoevenagel, J. prakt. Chem. [2] **97**, 288, 1918.
- (8) K. Moudgill, J. Indian Chem. Soc. **5**, 251, 1928.
- (9) L. Ruzicka and W. Bosch, Helv. Chim. Acta **14**, 1336, 1931.
- (10) L. Ruzicka, J. Meyer, and M. Mingazzini, Helv. Chim. Acta **5**, 345, 1922.
- (11) L. Ruzicka and A. G. van Veen, Ann. **468**, 143, 1929.
- (12) Schimmel and Co., Oct. 1909.
- (13) O. Schreiner and R. Kremers, Pharm. Arch. **4**, 141, 1901.
- (14) F. W. Semmler and A. Becker, Ber. **46**, 1814, 1913.
- (15) J. L. Simonsen, "The Terpenes," Vol. 2, p. 493, London, Cambridge University Press, 1932.

4. CYCLENES WITH AN ALKENE-ALKYNE OR ALKATRIENE
 SUBSTITUTION, C_nH_{2n-8}

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-(3-Propylhexen-3- yne-1)-cyclohexene-1 		98 to 100 ° @ 2mm	0.8796 °	1.5160 °	
C₁₆H₂₄ 2,4,4-Trimethyl-3-(3- methylhexatrien- 1,3,5-yl)-cyclohexene-1 		127 to 130 ° @ 10mm			
C₁₇H₂₆ 1-(3-Butylhepten-3- yne-1)-cyclohexene-1 		112 to 113 ° @ 2mm	0.8724 °	1.5110 °	


(1) P. Karrer, H. Salomon, R. Morf, and O. Walker, *Helv. Chim. Acta* **15**, 878, 1932.

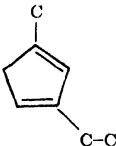
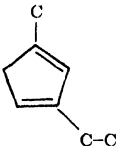
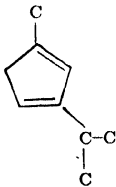
(2) G. A. Nesty and C. S. Marvel, *J. Am. Chem. Soc.* **59**, 2662, 1937.

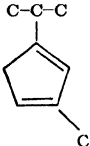
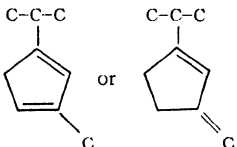
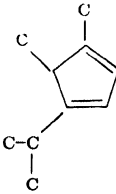
IX. CYCLODIENES OR CYCLODIOLEFINS


1. Cycloienes with alkyl substitutions, C_nH_{2n-4}
2. Cycloienes with an alkenyl or olefin substitution, C_nH_{2n-6}


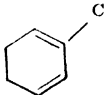
1. CYCLODIENES OR CYCLODIOLEFINS WITH ALKYL
 SUBSTITUTIONS, C_nH_{2n-4}
 C_5H_6

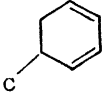
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclopentadiene 	-85 ⁸¹	42.5 ²⁶ 40 ⁸¹ 41 ⁵⁶ 41.5 to 42 ⁸² 41 ¹¹⁰ @ 757mm 40.2 to 41.6 ⁴ @ 757mm 40.2 to 40.8 ⁴ @ 757mm 40 to 41 ³⁴ @ 755mm 40 ⁸³ @ 715mm	0.803 ²⁶ 0.7983 ¹¹⁰ @ 19.5° 0.80475 ⁵⁶ @ 18.6° 0.8070 ⁴ @ 16.1° 0.8085 ⁴ @ 16.1° 0.8071 ²⁷ @ 15.7° 0.81500 ⁵⁶ D_{1b}^{1b} 0.8083 ²⁷ @ 14.1°	1.4398 ¹¹⁰ @ 19.5° 1.4446 ⁵⁶ @ 18.6° 1.44627 ⁴ @ 16.1° 1.44113 ⁸² $n_{H_a}^{20}$ @ 15.7° 1.44252 ⁴ $n_{H_a}^{16.1}$ 1.44378 ²⁷ $n_{H_a}^{15.7}$ 1.44443 ²⁷ $n_{H_a}^{14.1}$ 1.45380 ⁸² $n_{H_\beta}^{20}$ 1.45533 ⁴ $n_{H_\beta}^{16.1}$ 1.45662 ²⁷ $n_{H_\beta}^{15.7}$ 1.457332 ²⁷ $n_{H_\beta}^{14.1}$ 1.46318 ⁴ $n_{H_\gamma}^{16.1}$ 1.46353 ⁴ $n_{H_\gamma}^{16.1}$ 1.46462 ²⁷ $n_{H_\gamma}^{15.7}$ 1.46539 ²⁷ $n_{H_\gamma}^{14.1}$	

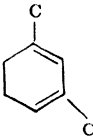
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
x-Methylcyclopentadiene-x,x 		69 to 70 ¹¹⁰ @ 736mm	0.8200 ¹¹⁰ @ 18°	1.4460 ¹¹⁰ @ 18°	
C₅H₁₀ 1-Methyl-3-ethyl- cyclopentadiene-1,3 		135 ²³			
C₉H₁₄ 1-Methyl-3-isopropyl- cyclopentadiene-1,3 		152 to 158 ⁸⁵ 50 to 55 ⁸⁵ @ 20mm	0.840 ⁸⁵	1.4758 ⁸⁵	

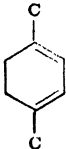
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Methyl-1-isopropyl- cyclopentadiene-1,3 		147 to 149 ⁸⁴	0.825 ⁸⁴ @ 15°	1.4630 ⁸⁴ @ 15°	
3-Methyl-1-isopropyl- cyclopentadiene-1,3- or 3-Methylene-1-iso- propyl-cyclopentene-1 		166 to 167 ⁹⁸	0.845 ⁹⁸ @ 21°	1.4913 ⁹⁸	
C₁₀H₁₆ 1,5-Dimethyl-4-iso- propylcyclopenta- diene-1,3 (Isothujene) (Tanacetene) 		172 to 175 ⁹⁰ 171 to 178 ⁵⁵ 171 to 176 ⁵⁴ 170 to 172 ⁹¹ 60 to 63 ⁷⁴ @ 14mm	0.8386 ⁵⁵ @ 22° 0.836 ⁹¹ 0.840 ^{87,90} 0.8408 ⁷⁴ 0.8400 ⁵⁴ @ 17°	1.47145 ⁹¹ 1.4761 ⁹⁰ 1.476 ⁷⁴ 1.47674 ⁵⁵ 1.4789 ⁵⁴ @ 17°	[α] _D = -1.9° ⁵⁵

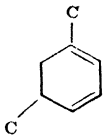
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cyclohexadiene-1,3					
		81.5 ³⁹	0.8296 ²¹	1.4679 ⁵²	
		81 to 82 ^{32,112}	D_{16}^{25}	@ 22°	
		81 ¹⁹	0.8347 ⁵²	1.4742 ¹⁷	
		80.5 to 81 ⁴⁹	@ 22°	1.4699 ¹⁸	
		80.13 ¹⁷	0.840 ¹⁹	1.4755 ⁴⁹	
		80 to 81 ¹⁰⁵	0.8410 ⁴⁹	1.4628 ¹⁰⁸	
		80 ³⁰	0.8413 ¹⁷	@ 18.5°	
		79.8 to 80 ¹¹¹	0.8451 ¹⁰⁴	1.4788 ¹¹²	
		80.5 to 80.7 ¹⁰¹	0.8478 ¹⁵	@ 18°	
		@ 752mm	0.8503 ³⁹	1.4760 ³⁰	
		83 to 84 ⁷⁸	D_{19}^{19}	@ 16°	
		@ 750mm	0.8340 ¹⁰⁸	1.4766 ¹⁰⁴	
		79 to 80 ⁵²	@ 18.5°	@ 16°	
		@ 750mm	0.8421 ³⁰	1.47254 ³³	
		79 to 80 ¹⁰⁸	@ 16°	$n_{H_a}^{15.6}$	
		@ 736mm	0.8489 ¹⁰⁴	1.46371 ²¹	
			@ 16°	$n_{H_a}^{15.4}$	
			0.84785 ³³	1.48687 ³³	
			@ 15.5°	$n_{H_\beta}^{15.6}$	
			0.83659 ²¹	1.47672 ²¹	
			@ 15.4°	$n_{H_\beta}^{15.4}$	
			0.8377 ²¹		
			D_{16}^{15}	1.49589 ³³	
			0.84987 ³³	$n_{H_\gamma}^{15.6}$	
			D_{16}^{15}	1.48493 ²¹	
			0.8454 ⁷⁸	$n_{H_\gamma}^{15.4}$	
			@ 10°		
			0.8476 ²¹		
			@ 4°		

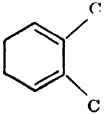
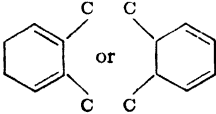
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cyclohexadiene-1,4 		88.4 to 89.4 ¹⁰⁴ @ 769mm 85.5 ¹⁰⁶ 85 to 87 ¹¹¹ 84 to 86 ¹¹ 86 to 87 ⁷⁸ @ 750mm 78 to 79 ¹¹¹ @ 750mm	0.8357 ³⁹ D ₂₈ ²⁵ 0.8569 ¹⁰⁴ 0.8471 ¹⁰⁶ 0.8519 ¹⁰⁶ @ 15° 0.8605 ⁷⁸ @ 10°	1.46806 ³⁹ @ 25° 1.4679 ¹¹¹ 1.4729 ¹⁰⁶ 1.4781 ¹⁰⁴ @ 15.2°	
Cyclohexadiene-x,x		82 to 83 ³¹ 82 to 84 ¹⁶ @ 718mm	0.8466 ¹⁶ @ 21.2° 0.846 ³¹ 0.8478 ¹⁶	1.47296 ¹⁶ @ 21.2° 1.46921 ¹⁶ n _{H_a} ^{21,2} 1.48258 ¹⁶ n _{H_β} ^{21,2} 1.49092 ¹⁶ * n _{H_γ} ^{21,2}	*Index of refraction for other wave lengths given by author. ¹⁶
C₇H₁₀ 2-Methylcyclo- hexadiene-1,3 		110 ¹⁰⁶ @ 741mm	0.8292 ^{106, 107}	1.4710 ^{106, 107}	

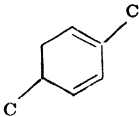
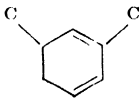
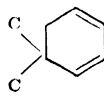
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
d-5-Methylcyclohexadiene-1,3 		105.5 to 106 ¹⁰⁵	0.8274 ¹⁰⁵	1.4680 ¹⁰⁵	
5-Methylcyclohexadiene-1,3		100.5 to 101.5 ³⁸ @ 762mm	0.8252 ³⁸ @ 22.5°	1.46619 ³⁸ @ 22.5° 1.46225 ³⁸ $n_{H_a}^{22.5}$ 1.48519 ³⁸ $n_{H_\gamma}^{22.5}$	
x-Methylcyclohexadiene-1,3		108 to 110 ⁶⁵ 106 to 107 ⁵³	0.7970 ⁶⁵ 0.8014 ⁵³ @ 18.3° 0.8088 ⁵³ @ 15°	1.4444 ⁶⁵ 1.4460 ⁵³ @ 18.3°	


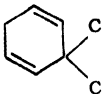
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,3-Dimethylcyclohexadiene-1,3 (Dihydro- <i>m</i> -xylene) <div>  </div>		135 to 137 ⁶⁵ 135 to 136 ⁴³ 133 to 135 ³ 133 to 134 ³ 132 to 135 ³ 131 ⁸⁷	0.8324 ⁶⁵ 0.8373 ⁴³ 0.8389 ⁶⁵ 0.8270 ³ @ 17.6° 0.8356 ³ @ 16.6° 0.8365 ³ @ 16.2°	1.441 ⁸⁷ @ 23° 1.4697 ⁶⁵ 1.4787 ⁶⁵ 1.4856 ⁴³ 1.46621 ³ @ 17.3° 1.47368 ³ @ 16.6° 1.47388 ³ @ 16.2° 1.46621 ³ $n_{H_a}^{17.3}$ 1.46959 ³ $n_{H_a}^{16.6}$ 1.46994 ³ $n_{H_a}^{16.2}$ 1.47934 ³ $n_{H_\beta}^{17.3}$ 1.48249 ³ $n_{H_\beta}^{16.6}$ 1.48287 ³ $n_{H_\beta}^{16.2}$ 1.48646 ³ $n_{H_\gamma}^{17.3}$ 1.49053 ³ $n_{H_\gamma}^{16.6}$ 1.49180 ³ $n_{H_\gamma}^{16.2}$	

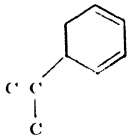
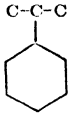
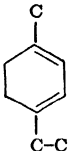
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,4-Dimethylcyclohexadiene-1,3 		135 to 138 ° 29.7 to 30 ° @ 13mm 29.5 to 29.9 ° @ 11mm	0.8306 ° @ 19° 0.8358 ° @ 19° 0.8366 ° @ 16.3° @ 11mm @ 15.5°	1.47921 ° 1.47966 ° @ 19° 1.49380 ° @ 16.1° 1.49385 ° @ 15.7° 1.47535 ° $n_{H_a}^{19}$ 1.47554 ° $n_{H_a}^{16.3}$ 1.48219 ° $n_{H_a}^{16.1}$ 1.47793 ° $n_{H_a}^{15.7}$ 1.49129 ° $n_{H_\beta}^{19}$ 1.49079 ° $n_{H_\beta}^{16.3}$ 1.49380 ° $n_{H_\beta}^{16.1}$ 1.49385 ° $n_{H_\beta}^{15.7}$ 1.50191 ° $n_{H_\gamma}^{19}$ 1.50074 ° $n_{H_\gamma}^{16.3}$ 1.50459 ° $n_{H_\gamma}^{16.1}$ 1.50445 ° $n_{H_\gamma}^{15.7}$	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,5-Dimethylcyclohexadiene-1,3 		128 to 130 ³⁹ 128 to 129 ⁷ 124 to 126 ⁷ @ 756mm 130 to 132.3 ⁷ @ 754mm 128 to 130 ⁷ @ 754mm 126.8 to 128 ⁷ @ 754mm 126 to 128 ³⁵ @ 750mm	0.821 ⁷ 0.8229 ⁷ @ 19.8° 0.8189 ⁷ @ 19.7° 0.8205 ⁷ @ 18.4° 0.8221 ⁷ @ 18° 0.8203 ³⁹ D_{18}^{18} 0.8272 ⁷ @ 16.2°	1.471 ⁷ 1.47212 ⁷ @ 19.7° 1.46877 ⁷ @ 19.5° 1.46946 ⁷ @ 18.9° 1.47103 ⁷ @ 18.7° 1.46360 ³⁹ @ 18° 1.47466 ⁷ @ 16.0° 1.467 ⁷ $n_{H_a}^{20}$ 1.46828 ⁷ $n_{H_a}^{19.7}$ 1.46493 ⁷ $n_{H_a}^{19.5}$ 1.46561 ⁷ $n_{H_a}^{18.9}$ 1.46719 ⁷ $n_{H_a}^{18.7}$ 1.47052 ⁷ $n_{H_a}^{18.0}$ 1.48214 ⁷ $n_{H_\beta}^{19.7}$ 1.47850 ⁷ $n_{H_\beta}^{19.5}$ 1.47939 ⁷ $n_{H_\beta}^{18.9}$ 1.48096 ⁷ $n_{H_\beta}^{18.7}$ 1.48476 ⁷ $n_{H_\beta}^{18.0}$ 1.49096 ⁷ $n_{H_\gamma}^{19.7}$	

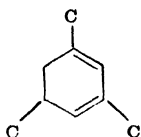
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,5-Dimethylcyclohexadiene-1,3 <i>(Continued)</i>				1.48725 ⁷ <i>n</i> _{H_γ} ^{19.5} 1.48821 ⁷ <i>n</i> _{H_γ} ^{18.9} 1.48978 ⁷ <i>n</i> _{H_γ} ^{18.7} 1.49367 ⁷ <i>n</i> _{H_γ} ^{16.0}	
2,3-Dimethylcyclohexadiene-1,3 		135.5 ⁴³	0.8521 ⁴³	1.4895 ⁴³	
2,3 or 5,6-Dimethylcyclohexadiene-1,3 (Karanthrene) 		138 to 139 ⁷² 135.5 ⁴³ 134 to 137 ⁵⁹ 134 to 135 ⁶² 134 ⁶³	0.8373 ⁵⁹ 0.8521 ⁴³ 0.8531 ⁷² @ 18.6°	1.4692 ⁵⁹ 1.4895 ⁴³ 1.49118 ³⁹ 1.4848 ⁷² @ 18.6° 1.4966 ³⁹ @ 18°	

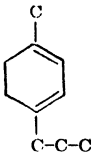
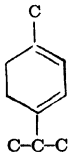
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (at 760mm)	D_4^{20}	n_D^{20}	Additional Data
2,5-Dimethylcyclohexadiene-1,3 		132.5 to 133.5 ^{106,107} 131.5 to 132.5 ^{106,107} @ 740mm	$0.8223 \begin{Bmatrix} 106, \\ 107 \end{Bmatrix}$	$1.4675 \begin{Bmatrix} 106, \\ 107 \end{Bmatrix}$	
2,6-Dimethylcyclohexadiene-1,3 		129 to 130 ¹⁰⁶ @ 745mm	0.8225^{106} 0.8268^{106} @ 15°	1.4675^{106}	$[\alpha]_D = 27.38^\circ^{106}$
5,5-Dimethylcyclohexadiene-1,3 		111 ²⁰ @ 770mm 110 to 111 ³⁹	0.810₃ 0.8083^{61} D_{25}^{25} 0.8117^{61} D_{20}^{20} 0.814^{39} D_{18}^{18} 0.8153^{61} D_{15}^{15} 0.81573^{61} @ 14° 0.8193^{61} D_{10}^{10} 0.8246^{61} @ 4°	1.45630^{39} @ 18° 1.45482^{61} n_H^{14} 1.46733^{61} n_H^{14} 1.47530^{61} n_H^{14} n_H^{14}	$\frac{dD}{dt} = -0.00087/^\circ\text{C.}$ (5° to 25°)

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,4-Dimethylcyclohexadiene-1,4 		133 to 134 ° @ 720mm			
3,3-Dimethylcyclohexadiene-1,4 			0.8421 ⁸⁹ @ 18° 0.8433 ³⁹ D_{18}^{18}	1.47691 ³⁹ @ 18°	
1,3-Dimethylcyclohexadiene-x,x		133 to 134 ⁹³ 132 to 134 ⁸⁹	0.8275 ⁸⁹	1.4675 ⁸⁹	
x,x-Dimethylcyclohexadiene-x,x		123 ⁸⁸	0.7948 ⁵³ @ 20.5° 0.7998 ⁵³ @ 15°	1.4416 ⁵³ @ 20.5°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
5-Isopropylcyclohexadiene-1,3 		165 to 167 ⁸⁴	0.846 ⁸⁴	1.495 ⁸⁴	
1-Isopropylcyclohexadiene-x,x 		140 ⁷⁷	0.8142 ⁷⁷	1.4628 ⁷⁷	
1-Methyl-4-ethylcyclohexadiene-1,3 		160.9 to 161.2 ² @ 761mm 159.5 to 160 ⁴ @ 751mm 51 to 51.2 ⁷⁰ @ 14mm 46 ⁷⁰ @ 12mm	0.8371 ² @ 19.5° 0.8408 ² @ 18.8° 0.8393 ² @ 18.4° 0.8408 ⁷⁰ @ 15.6° 0.8411 ⁷⁰ @ 15.2°	1.48413 ⁷⁰ 1.48250 ² 1.48181 ² @ 19.9° 1.49263 ² @ 18° 1.47828 ² $n_{H_a}^{20}$ 1.47750 ² $n_{H_a}^{19.9}$ 1.47823 ² $n_{H_a}^{18}$ 1.48002 ⁷⁰ $n_{H_a}^{15.6}$ 1.49353 ² $n_{H_\beta}^{20}$	

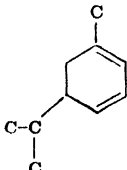
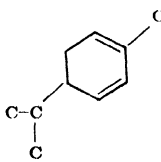
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-ethylcyclohexadiene-1,3 (Continued)				1.49294 ² <i>n</i> _{H_β} ^{19.9} 1.49345 ² <i>n</i> _{H_β} ¹⁸ 1.49537 ⁷⁰ <i>n</i> _{H_β} ^{15.6} 1.50422 ² <i>n</i> _{H_γ} ²⁰ 1.50371 ² <i>n</i> _{H_γ} ^{19.6} 1.50347 ² <i>n</i> _{H_γ} ¹⁸ 1.50574 ⁷⁰ <i>n</i> _{H_γ} ^{15.6}	
1,3,5-Trimethylcyclohexadiene-x,x (Dihydromesitylene)		166 to 168 ⁸⁵ 147 ⁹³	0.8454 ⁸⁵ 0.8475 ⁸⁵ 0.826 ⁹³ @ 18°	1.4773 ⁸⁵ 1.4810 ⁸⁵	




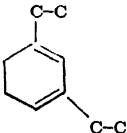
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
1-Methyl-4-propyl- cyclohexadiene-1,3 		65.4 to 66 ⁷⁰ @ 13.5mm 62 to 72 ⁹⁸ @ 6mm	0.8353 ⁷⁰ 0.8713 ⁹⁸ @ 15° 0.8726 ⁹⁸ D_0^{15}	1.47942 ⁷⁰ @ 18.9° 1.48761 ⁹⁸ @ 15° 1.47535 ⁷⁰ $n_{H_a}^{15.9}$ 1.49013 ⁷⁰ $n_{H_B}^{18.0}$ 1.49979 ⁷⁰ $n_{H_\gamma}^{15.9}$	
1-Methyl-4-isopropyl- cyclohexadiene-1,3 (α-Terpinene) 		174 to 176 ³⁶ @ 766mm 163 to 166 ⁶⁴ @ 765mm 179 to 181 ⁹⁴ 179 to 180.5 ⁸ 174.8 to 175.2 ⁷⁶ 173.5 to 175 ⁶⁷ @ 755mm 173.5 to 174.8 ⁶⁹ @ 755mm 174.8 to 175.4 ¹ @ 750mm 160 to 164 ⁶⁴ @ 750mm 174 to 176 ¹ @ 742mm 68 to 70 ⁴¹ @ 15mm 62 @ 15mm ⁶⁷	0.8441 ³⁶ D_{27}^{27} 0.8529 ²⁵ D_{21}^{23} 0.8443 ⁷⁹ @ 20.2° 0.834 ⁷⁶ 0.845 ^{75,76} 0.846 ⁹⁴ 0.8361 ² @ 19.6° 0.8375 ⁶⁹ @ 19.6° 0.8353 ⁷⁰ @ 18.9° 0.8411 ³⁹ @ 18.5° 0.8423 ³⁹ $D_{18.5}^{18.5}$ 0.8474 ⁴² $D_{18.5}^{18.5}$ 0.8382 ⁶⁹ @ 18.3°	1.48451 ³⁶ @ 27° 1.4748 ²⁵ @ 23° 1.49065 ⁷⁹ @ 20.2° 1.4784 ⁷⁵ 1.4789 ⁹⁴ 1.480 ⁶⁴ 1.4905 ^{75,76} 1.477 ^{67,69} @ 19.7° 1.47810 ¹ @ 19.4° 1.47942 ⁷⁰ @ 18.9° 1.48724 ⁴² @ 18.5° 1.48579 ⁴¹ @ 18° 1.48005 ¹ @ 16.9°	

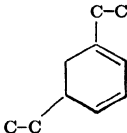
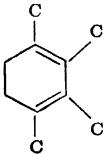
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-isopropyl- cyclohexadiene-1,3 (Continued)		65.4 to 66 ° ⁷⁰ @ 13.5mm	0.838 ⁴⁷ @ 18°	1.48107 ¹ @ 16.6°	
		60 to 63 ⁴² @ 12mm	0.8453 ⁴¹ @ 18°	1.48015 ¹ @ 15.8°	
		59 to 62 ⁷⁵ @ 10mm	0.8361 ¹ @ 16.2°	1.48722 ² @ 14.8°	
		59 to 60 ¹ @ 11.5mm	0.8372 ¹ @ 16°	1.48218 ¹ @ 13°	
		61.5 to 62.5 ⁷⁸ @ 10mm	0.8389 ¹ @ 16°	1.48822 ² @ 12.5°	
			0.8408 ¹ @ 16°	1.49070 ² @ 12.5°	
			0.847 ⁴⁴ @ 16°	1.48643 ⁷⁰ n _{H_a} ^{20.2}	
			0.8504 ² @ 16°	1.47359 ¹ n _{H_a} ^{19.4}	
			0.8538 ² @ 12.9°	1.47535 ¹ n _{H_a} ^{18.9}	
			0.8561 ² @ 12.1°	1.48333 ¹ n _{H_a} ^{18.8}	
				1.47535 ¹ n _{H_a} ^{18.9}	
				1.47637 ¹ n _{H_a} ^{18.8}	
				1.47603 ¹ n _{H_a} ^{18.8}	
				1.48273 ² n _{H_a} ^{14.3}	
				1.47807 ¹ n _{H_a} ¹³	
				1.48393 ² n _{H_a} ^{12.5}	
				1.48655 ² n _{H_a} ^{12.8}	
				1.50169 ⁷⁰ n _{H_β} ^{20.2}	
				1.48837 ¹ n _{H_β} ^{19.4}	

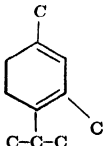
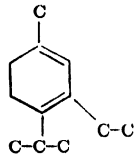
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-isopropyl- cyclohexadiene-1,3 (Continued)				1.49013 ¹ n _{H_β} ^{18.9}	
				1.49022 ¹ n _{H_β} ^{16.6}	
				1.49707 ² n _{H_β} ^{14.8}	
				1.49286 ¹ n _{H_β} ¹³	
				1.49828 ² n _{H_γ} ^{12.6}	
				1.50087 ² n _{H_γ} ^{12.6}	
				1.51166 ⁷⁹ n _{H_γ} ^{20.2}	
				1.49795 ¹ n _{H_γ} ^{19.4}	
				1.49979 ¹ n _{H_γ} ^{18.9}	
				1.50701 ¹ n _{H_γ} ^{18.6}	
				1.50006 ¹ n _{H_γ} ^{18.9}	
				1.50064 ¹ n _{H_γ} ^{16.6}	
				1.50018 ¹ n _{H_γ} ^{15.8}	
				1.50631 ² n _{H_γ} ^{14.8}	
				1.50254 ¹ n _{H_γ} ¹³	
				1.50744 ² n _{H_γ} ^{12.6}	
				1.51031 ² n _{H_γ} ^{12.6}	

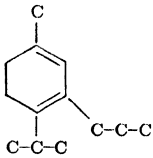


Name and Carbon Skeleton	M. P., °C.	B. P., °C. (or 760mm)	D_4^{20}	n_D^{20}	Additional Data
1-Methyl-5-isopropyl- cyclohexadiene-1,3 		169 to 171 ⁴⁷	0.8515 ⁴⁷ D_{20}^{20}	1.47270 ⁴⁷	
2-Methyl-5-isopropyl- cyclohexadiene-1,3 (d-α-Phellandrene) 		175 to 176 ^{72,74} 172 to 173.5 ¹⁸ 89.3 to 90.8 ¹⁸ @ 56.5mm 70 ⁴⁰ @ 15mm 66 ⁴⁰ @ 14mm 61 ⁹⁷ @ 11mm	0.8324 ¹⁸ @ 30° 0.8473 ⁴⁰ @ 21° 0.844 ⁸⁸ 0.8447 ⁴⁰ 0.8440 ⁹⁷ @ 19° 0.8565 ⁷⁴ @ 15°	1.4695 ¹⁸ @ 30° 1.48825 ⁴⁰ @ 21° 1.48345 ⁴⁰ 1.4732 ⁹⁷ @ 19°	$[\alpha]_D = +44.66^\circ$ ⁸⁸ $[\alpha]_D = +45^\circ$ ⁴⁰ $\frac{dD}{dt} = -0.0023/^\circ\text{C.}$ (15° to 25°)

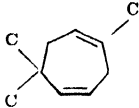

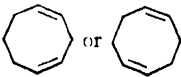

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-5-isopropyl- cyclohexadiene-1,3 (<i>l</i> -α-Phellandrene)					[α] _D = -115° ⁶⁷
					[α] _D ²⁰ = -112.76° ⁸⁰
					[α] _D ²⁰ = -112° ⁸⁰
					[α] _D ³⁰ = -18.37° ⁶⁰
		174 to 177 ⁴ @ 759mm	0.8459 ⁶⁰ @ 30°	1.466 ⁶⁰ @ 30°	
		171 to 172 ⁸⁰ @ 758.2mm	0.8372 ⁸⁰ @ 25°	1.4725 ⁸⁰ @ 25°	
		173 to 175 ⁶⁰ @ 758mm	0.8387 ⁸⁰ @ 25°	1.47697 ⁵ @ 22°	
		173 to 175 ⁶⁷ @ 754mm	0.8426 ⁵ @ 22°	1.4732 ⁸⁰ 1.488 ⁹²	
		67 to 68 ⁸⁰ @ 22mm	0.8410 ⁸⁰ 0.8425 ⁸⁰	@ 19° 1.4737 ⁶⁹	
		65.2 to 66 ^{5,8} @ 17mm	0.8465 ⁹² @ 19°	@ 17.5° 1.47746 ⁵	
		64 to 66 ⁵⁷ @ 17mm	0.8490 ⁵ @ 17.1°	@ 17.1° 1.48014 ⁵⁷	
		58 to 59 ⁸⁰ @ 16mm	0.844 ⁶⁷ @ 15°	@ 17° 1.47328 ⁵	
		60 to 60.5 ^{67,69} @ 15mm	0.8448 ⁵⁷ @ 15°	n _H ²² _a 1.47418 ⁵	
		65 ⁹² @ 12mm		n _H ^{17.1} _a 1.48624 ⁵	
				n _H ²² _β 1.48580 ⁵	
				n _H ^{17.1} _β 1.49447 ⁵	
				n _H ²² _γ 1.49287 ⁵	
				n _H ^{17.1} _γ	
<i>dl</i>-α-Phellandrene					[α] _D = +4.12° ⁹⁵
		175 to 176 ⁹⁵ @ 22°	0.841 ⁹⁵ @ 22°	1.4760 ⁹⁵ @ 22°	

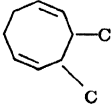
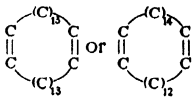
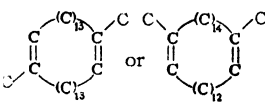
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-isopropyl- cyclohexadiene-1,4 (γ-Terpinene, Moslene) <div>  </div>		183 ^{67,69} 179 to 181 ⁸¹ 179 ⁴⁸ 178.5 to 180.5 ⁹¹ @ 740mm 174 ¹⁰ 69 to 73 ⁸⁸ @ 20mm 72.5 ^{67,89} @ 18mm 65.5 to 68 ¹⁰⁹ @ 14mm	0.849 ^{87,89} 0.846 ⁸¹ 0.8515 ⁶⁸ D ₁₆ ¹⁸ 0.853 ⁶⁹ @ 15°	1.4783 ¹⁰⁹ @ 21° 1.4789 ⁸¹ 1.4779 ⁴⁸ 1.4785 ⁶⁸ @ 18° 1.4754 ⁷¹ @ 15.6° 1.4765 ^{67,89} @ 14.5° 1.4720 ⁷¹ n _{H_a} ^{15,6} 1.4827 ⁷¹ n _{H_β} ^{15,6} 1.4894 ⁷¹ n _{H_γ} ^{15,6}	[α] _D = +2.5° ⁶⁸
Methyl-isopropyl- cyclohexadiene		171 to 172 ⁸³	0.8170 ⁸³ @ 15.5°	1.4564 ⁸³ @ 15.5°	
1,3-Diethylcyclo- hexadiene-1,3 <div>  </div>		68 @ 9mm ¹⁴			

<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
1,5-Diethylcyclohexadiene-1,3 		166 to 168 ⁴⁵	0.8659 ⁴⁵ <i>D₂₀²⁰</i>	1.47575 ⁴⁵	
1,2-Diethylcyclohexadiene-x,x		60 to 63 ⁷⁴ @ 14mm	0.8408 ⁷⁴	1.476 ⁷⁴	
1,2,3,4-Tetramethylcyclohexadiene-1,3 		180 to 182 ⁶⁵	0.8482 ⁶⁵ 0.8516 ⁶⁵	1.4816 ⁶⁵ 1.4850 ⁶⁵	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-4-isopropyl- cyclohexadiene-x,x		173.5 ⁴⁵ 172 to 174 ^{46,50} 75 to 80 ¹³ @ 9mm	0.8272 ⁴⁶ 0.8337 ⁴⁵ 0.8491 ¹³ 0.8408 ⁵⁰ D ₂₀ ²⁰ 0.8540 ⁵⁰ D ₀ ⁰	1.464 ⁴⁶ 1.46430 ⁴⁶ 1.46539 ⁴⁵ 1.49824 ¹³	[α] _D ²⁰ = +8.40° ¹³
C₁₁H₁₈ 1,3-Dimethyl-4-iso- propylcyclo- hexadiene-1,3		184 to 186 ⁶⁶ @ 737mm	0.8585 ⁶⁶ @ 25°	1.4845 ⁶⁶ @ 25°	[α] _D ¹⁸ = +0.04° ⁶⁶
					
C₁₂H₂₀ 1-Methyl-3-ethyl-4- isopropylcyclo- hexadiene-1,3		199 to 202 ⁶⁶ @ 737mm 83 to 85 ⁶⁶ @ 15mm	0.8631 ⁶⁶ @ 25°	1.4854 ⁶⁶ @ 25°	[α] _D ¹⁶ = +0.07° ⁶⁶
					

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-3-propyl-4-isopropylcyclohexadiene-1,3 		104 to 106 ⁶⁶ @ 14mm	0.8872 ⁶⁶ @ 25°	1.4865 ⁶⁶ @ 25°	
C₇H₁₀ Cycloheptadiene-1,2 		118 to 119 ³²	0.8532 ³²		
Cycloheptadiene-1,3 		120 to 121 ⁵⁸ 120 to 121 ¹⁰¹ @ 724mm 118 to 119 ¹⁰¹ @ 720mm 118 to 119 ⁹⁹ @ 715mm	0.8679 ²⁹ @ 17.6° 0.8859 ²⁸ @ 12.4° 0.8809 ^{100, 101} @ 0° 0.8815 ¹⁰¹ @ 0° 0.8823 ¹⁰⁰ @ 0° 0.8929 ⁹⁹ @ 0°	1.50066 ²⁸ n _{H_a} ^{12.4} 1.51663 ²⁸ n _{H_B} ^{12.4} 1.49597 ²⁹ n _{H_a} ^{17.6} 1.51202 ²⁹ n _{H_B} ^{17.6} *	*Index of refraction values for other wave lengths given by ref. (29).

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,6,6-Trimethylcycloheptadiene-1,4 (Euterpene) 		161 to 165 ¹²			
C₈H₁₂ Cyclooctadiene-1,3 		39.5 ¹⁰² @ 16.5mm	0.884 ¹⁰³ @ 0°		
Cyclooctadiene-1,4 or -1,5 		143 to 144 ¹⁰³	0.887 ¹⁰³ @ 0°		
Cyclooctadiene-1,5 		50 to 52 ²² @ 17mm	0.8564 ²² @ 20.7°	1.49646 ²² @ 20.7°	

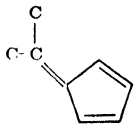
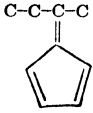
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,4-Dimethylcyclooctadiene-1,5 		68 to 71 ²² @ 15mm	0.8623 ²² @ 13°	1.49036 ²² @ 13°	
C₃₀H₅₆ Cyclotriacontadiene-1,16 or -1,15 	50 to 52 ⁷³	240 ⁷³ @ 0.4mm	0.8218 ⁷³ @ 80°	1.4564 ⁷³ @ 80°	
C₃₂H₆₀ 1,16-Dimethylcyclotriacontadiene-1,16 or -1,15 	64 to 65 ⁷³	250 @ 1mm ⁷³	0.8302 ⁷³ @ 80°	1.4641 ⁷³ @ 80° *	*Several values for <i>He</i> listed ⁷³

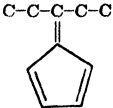
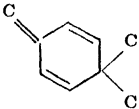
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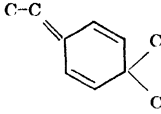
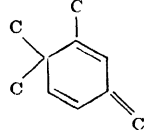
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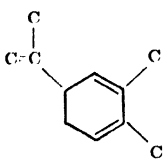
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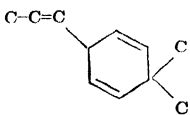
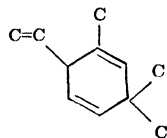
2. CYCLODIENES WITH AN ALKENYL OR OLEFIN
 SUBSTITUTION, C_nH_{2n-6}
 C_8H_{10}

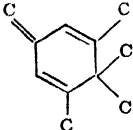
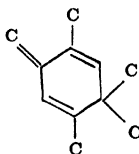
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
5-Isopropylidenecyclopentadiene-1,3 (Dimethylfulvene) <div>  </div>		153 to 154 ¹² @ 717mm 46 ¹² @ 11mm	0.881 ¹⁴ 0.8858 ¹² @ 17°	1.54740 ¹⁴ 1.53913 ¹⁴ $n_{H_a}^{20}$ 1.56918 ¹⁴ $n_{H_\beta}^{20}$	
C₉H₁₂ 3-Cyclopentadien-2,4-ylidenebutane (Methylethylfulvene) <div>  </div>		185 * <i>ca</i> 87.4 to 87.9 * @ 40mm 62.5 ¹³ @ 13mm 27 to 29 ¹⁴ @ 0.08 to 0.15mm	0.8772 * @ 20.9° 0.878 ¹⁴ 0.879 ¹⁴	1.53702 * @ 20.9° 1.5375 ¹⁴ 1.5377 ¹⁴ 1.52988 ¹ $n_{H_a}^{20,9}$ 1.50325 ¹⁴ $n_{H_a}^{20}$ 1.50326 ¹⁴ $n_{H_a}^{20}$ 1.55856 ¹⁴ $n_{H_\beta}^{20}$ 1.55857 ¹⁴ $n_{H_\beta}^{20}$	

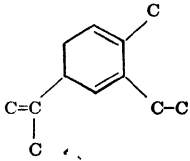
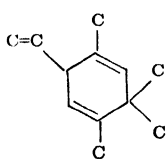
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
3-Cyclopentadien-2,4-ylidenepentane (Diethylfulvene) 		96.8 to 97.2 ¹³ @ 40mm 74.5 to 78.5 ¹ @ 19mm	0.8812 ² @ 16.4°	1.52997 ² @ 16.4°	
C₉H₁₂ 6-Methylene-3,3-dimethylcyclohexa- diene-1,4 		38 to 40 ⁴ @ 15mm	0.8360 ³ @ 15.8° 0.8430 ³ @ 15.2°	1.50295 ³ @ 15.8° 1.5086 ³ @ 14.95°	

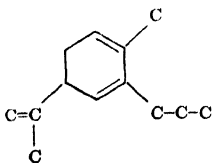
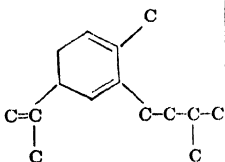
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
3,3-Dimethyl-6-ethylidenecyclohexadiene-1,4 		81.5 to 84 ° @ 25mm 71 to 73 ° @ 16mm	0.857 ° 0.8614 ° @ 15.5° 0.8613 ° @ 12.8°	1.51572 ° @ 15.15° 1.51477 ° @ 14.7° 1.51072 ° $n_{H_a}^{15.15}$ 1.50982 ° $n_{H_a}^{14.7}$ 1.53015 ° $n_{H_\beta}^{15.15}$ 1.52946 ° $n_{H_\beta}^{14.7}$ 1.54300 ° $n_{H_\gamma}^{15.15}$ 1.54221 ° $n_{H_\gamma}^{14.7}$	
C₁₀H₁₄ 3-Methylene-1,6,6-trimethylcyclohexadiene-1,4 		60 to 65 ° @ 15mm	0.8735 ° @ 10.7°	1.51813 ° @ 10.7° 1.51331 ° $n_{H_a}^{10.7}$ 1.53213 ° $n_{H_\beta}^{10.7}$ 1.54435 ° $n_{H_\gamma}^{10.7}$	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,3-Dimethyl-6-isopropenylcyclohexadiene-1,3 		197 ^s @ 746mm 90 to 91.5 ¹ @ 21mm 89.2 to 89.4 ¹ @ 18mm 82 to 83 ^s @ 15mm 75 to 76 ⁹ @ 10mm 72 to 73 ⁹ @ 8mm	0.8724 ^s @ 21.1° 0.8747 ⁹ 0.8738 ¹ @ 19° 0.8686 ¹ @ 18.8° 0.8776 ⁷ @ 15°	1.5000 ^s @ 21.1° 1.50152 ⁹ 1.49875 ¹ @ 19.0° 1.50124 ¹ @ 18.8° 1.50215 ⁷ @ 15° 1.49596 ¹ n _{H_a} ^{19.0} 1.49451 ¹ n _{H_a} ^{18.8} 1.49803 ⁷ n _{H_a} ¹⁵ 1.51100 ¹ n _{H_β} ^{19.0} 1.50888 ¹ n _{H_β} ^{19.8} 1.51260 ⁷ n _{H_β} ¹⁵ 1.52071 ¹ n _{H_γ} ^{19.0} 1.51785 ¹ n _{H_γ} ^{18.8} 1.50124 ⁷ n _{H_γ} ¹⁵	[α] _D ²¹ = +69.12° ^{7,8} [α] _D = 103.49° ⁹

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,3-Dimethyl-6-propen-1-yl-cyclohexadiene-1,4 		83 to 85 ° @ 13mm	0.8618 ° @ 15.2°	1.50633 ° @ 15.2° 1.50189 ° <i>n</i> _{H_a} ^{15.2} 1.51925 ° <i>n</i> _{H_β} ^{15.2} 1.52040 ° <i>n</i> _{H_γ} ^{15.2}	
1,3,3-Trimethyl-6-ethenylcyclohexadiene-1,4 		85 to 86 ° @ 15mm	0.8844 ° @ 12.7°	1.51931 ° @ 12.7° 1.51470 ° <i>n</i> _{H_a} ^{12.7} 1.53230 ° <i>n</i> _{H_β} ^{12.7} 1.54371 ° <i>n</i> _{H_γ} ^{12.7}	


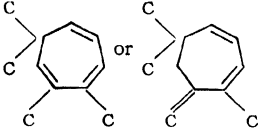
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
6-Methylene-2,3,3,4-tetramethylcyclohexadiene-1,4 		89 to 90 ° @ 15mm	0.8765 ° @ 23.3°	1.51350 ° @ 23.2° 1.50884 ° n _{H_a} ^{23.2} 1.52660 ° n _{H_β} ^{23.2} 1.53830 ° n _{H_γ} ^{23.2}	
6-Methylene-1,3,3,4-tetramethylcyclohexadiene-1,4 		77 @ 12mm °	0.8809 ° @ 15.2°	1.51687 ° @ 15.2° 1.51235 ° n _{H_a} ^{15.2} 1.53006 ° n _{H_β} ^{15.2} 1.54172 ° n _{H_γ} ^{15.2}	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-3-ethyl-5-isopropenylcyclohexadiene-1,3 (2-Ethyl- <i>p</i> -menthatriene-2,6,8(9)) 		100 to 101 ° @ 13.5mm	0.8859 ° @ 18° 0.8880 ° @ 15°	1.5041 ° @ 18° 1.50847 ° @ 15° 1.50429 ° <i>n</i> _{H_a} ¹⁸ 1.51920 ° <i>n</i> _{H_β} ¹⁸ 1.52763 ° <i>n</i> _{H_γ} ¹⁸	[α] _D ¹⁸ = +86.19° ^{7,8}
1,3,3,4-Tetramethyl-6-ethenylcyclohexadiene-1,4 		100 to 103 ° @ 18mm	0.8837 ° @ 15.4°	1.51452 ° @ 15.4° 1.51028 ° <i>n</i> _{H_a} ^{18,4} 1.52702 ° <i>n</i> _{H_β} ^{18,4} 1.53796 ° <i>n</i> _{H_γ} ^{18,4}	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-3-propyl-5-isopropenylcyclohexadiene-1,3 (2-Propylmenthatriene-2,6,8(9)) 		107 to 108 ° @ 13mm	0.8804 ° @ 15°	1.50273 ° @ 15° 1.49900 ° n _{H_a} ¹⁶ 1.51312 ° n _{H_β} ¹⁶ 1.52141 ° n _{H_γ} ¹⁶	[α] _D ²⁰ = +86.20 ° ⁷
C₈H₁₄ 2-Methyl-5-isopropenyl-3-(3-methylbutyl)-cyclohexadiene-1,3 		135 to 137 ° ¹⁰ @ 15mm 130 to 132 ° ¹¹ @ 11mm	0.8679 ° ¹¹ 0.8703 ° ¹⁰	1.49478 ° ¹¹ 1.4952 ° ¹⁰	[α] _D ²⁰ = +18.5 ° ¹¹ [α] _D ²⁰ = +18 ° ¹⁰

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X. CYCLOTRIENES OR CYCLOTRIOLEFINS, C_nH_{2n-6}

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cycloheptatriene-1,3,5 (Tropilidene) 		116 ° 115.5 to 116.5 ° 114 ° 117 ° @ 724mm	0.8929 ¹ @ 17.5° 0.9129 ² @ 0° 0.9082 ^{1,4,5} @ 0°		
$C_{11}H_{16}$ 4,5,7,7-Tetramethyl- heptatriene-1,3,5 or 5-Methylene-4,4,7-tri- methylheptadiene-1,3 		67 to 68 ° @ 11mm	0.8687 ³	1.50660 ³	

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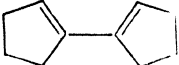
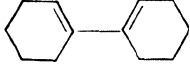
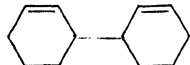
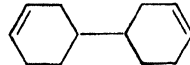
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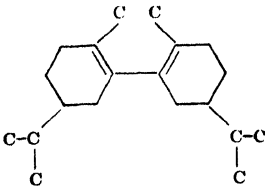
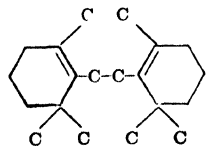
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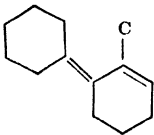
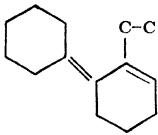
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XI. DICYCLENES OR DICYCLOÖLEFINS

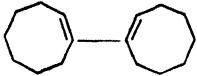
1. Dicyclenes with alkyl substitutions, C_nH_{2n-6}
2. Dicyclenes with an alkyne substitution, C_nH_{2n-10}

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
1-Cyclopenten-1-ylcyclopentene-1 (1,1'-Dicyclopentenyl) 		208 ²			
C₁₂H₁₈ 1-Cyclohexen-1-ylcyclohexene-1 (1,1'-Dicyclohexenyl) 	28 ²	245 to 251 ² 250 to 253 ⁹ 120 to 125 ⁹ @ 15mm	0.9485 ⁹	1.5287 ⁹	
1-Cyclohexen-2-ylcyclohexene-2 (2,2'-Dicyclohexenyl) 		234 ²	0.9293 ²	1.5090 ²	*Author states that "The hydrocarbon was apparently an octahydrodiphenyl which was isomeric with the one having conjugated double bonds which has been described by Wallach."
1-Cyclohexen-3-ylcyclohexene-3 (3,3'-Dicyclohexenyl) 		230 to 232 ¹			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-5-isopropyl- 1-(2-methyl-5-isopro- pylcyclohexen-1-yl)- cyclohexene-1 		190 to 195 ¹⁰ @ 30mm	0.945 ¹⁰	1.5172 ¹⁰	
1,2-Di-(2,6,6-trimethyl- cyclohexen-1-yl)- ethane (Di-β-cyclogeranyl) 		116 °			

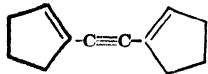
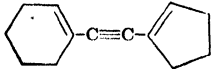
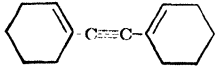
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-6-cyclohexylidenecyclohexene-1 		130 to 132 ° @ 20mm	0.9282 ° 0.9432 ° @ 0°	1.5165 °	
C₁₄H₂₂ 1-Ethyl-6-cyclohexylidenecyclohexene-1 		139 to 141 ° @ 20mm	0.9308 ° 0.9461 ° @ 0°	1.5172 °	
3,3'-Dimethyldicyclohexenyl-x,x		265 to 267 °			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,7,12,16-Tetramethyl-1,18-di-(2,6,6-trimethylcyclohexen-1-yl)-octadecane (Octadecahydrocarotene) <div> </div>		276 ° @ 1mm	0.8524 ° @ 80.0° 0.8828 ° @ 29.2°	1.4792 ° @ 46° 1.4848 ° @ 31° 1.4869 ° @ 25°	$[\alpha]_D^{15} = +7.56^\circ$
1-Cyclohepten-1-ylcycloheptene-1 (1,1'-Dicycloheptenyl) <div> </div>	C ₁₄ H ₂₂				

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1-Cycloöcten-1-ylcycloöctene-1 (1,1'-Dicycloöctenyl) 	36 to 37 °	115 to 116 ° @ 0.25mm	0.9630 ° @ 21.8°	1.5353 ° @ 24°	

- (1) K. Alder and H. F. Rickert, Ber. **71**, 373, 1938.
- (2) E. de B. Barnett and C. A. Lawrence, J. Chem. Soc. **1935**, 1104.
- (3) D. S. Frederick, H. D. Cogan, and C. S. Marvel, J. Am. Chem. Soc. **56**, 1815, 1934.
- (4) C. E. Garland and E. E. Reid, J. Am. Chem. Soc. **47**, 2333, 1925.
- (5) M. Godchot and G. Cauquil, Compt. rend. **186**, 767, 1928.
- (6) R. Kuhn and M. Hoffer, Ber. **67**, 357, 1934.
- (7) L. Ruzicka and H. A. Boekenoogen, Helv. Chim. Acta, **14**, 1319, 1931.
- (8) J. H. C. Smith, J. Biol. Chem. **90**, 597, 1931.
- (9) O. Wallach, Ann. **381**, 95, 1911.
- (10) O. Wallach, Ann. **403**, 73, 1914.

2. DICYCLENES WITH AN ALKYNE SUBSTITUTION, C_nH_{2n-10}

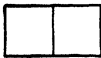
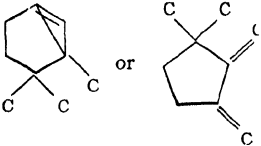

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
Dicyclopenten-1-ylacetylene 	58.5 to 60 ¹	105 to 110 ¹ @ 2mm			
C₁₃H₁₆ Cyclohexen-1-yl-cyclopenten-1-ylacetylene 		103 to 104 ³ @ 2.5mm	0.9610 ³	1.5582 ³	
C₁₄H₁₈ Dicyclohexen-1-ylacetylene 		158 to 159 ⁴ @ 12mm 126 to 128 ³ @ 3mm 105 to 110 ² @ 1.5mm	0.9934 ³ 0.9604 ⁴ D ₁₃ ¹³	1.5520 ³ 1.5549 ² 1.55768 ⁴ @ 13°	

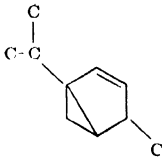

(1) P. S. Pinkney and C. S. Marvel, J. Am. Chem. Soc. **59**, 2669, 1937.(2) P. S. Pinkney, G. A. Nesty, D. E. Pearson, and C. S. Marvel, J. Am. Chem. Soc. **59**, 2666, 1937.(3) P. S. Pinkney, G. A. Nesty, R. H. Wiley, and C. S. Marvel, J. Am. Chem. Soc. **58**, 972, 1936.(4) Ju. Salkind and N. Schuwalow, J. Gen. Chem. (U.S.S.R.) **7**, 1235, 1937.

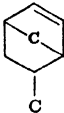
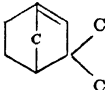
XII. BICYCLENES OR BICYCLOÖLEFINS

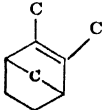
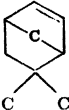
1. Bicyclenes with alkyl substitutions, C_nH_{2n-4}
2. Bicyclenes with an alkenyl substitution, C_nH_{2n-6}



1. BICYCLENES WITH ALKYL SUBSTITUTIONS, C_nH_{2n-4} C_nH_2

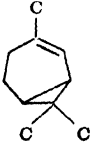
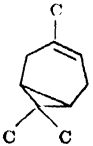
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
[0,2,2]-Bicyclohexene-x 		230 to 232 ⁴⁰ 103 @ 8mm ⁴⁰			
C_9H_{14} 3,4,4-Trimethyl-[0,1,3]-(1,3)-bicyclohexene-1 or 2,3-Dimethylene-1,1-dimethylcyclopentane 		127 to 128 ⁹ @ 757mm	0.8292 ⁹ @ 0°		
$C_{10}H_{16}$ d-1-Methyl-4-isopropyl-[0,1,3]-(4,6)-bicyclohexene-1 (α -Thujene) 		152 to 152.5 ¹⁰² @ 699mm 151 to 152 ⁸⁷ 151 to 152 ⁸⁸ @ 755mm	0.8314 ¹⁰² D_{30}^{20} 0.8262 ⁸⁷ D_{20}^{20} 0.8294 ⁸⁸ @ 17.4°	1.4502 ¹⁰² @ 30° 1.44909 ⁸⁷ 1.45182 ⁸⁸ @ 15.65° 1.44904 ⁸⁸ $n_{H_a}^{15.65}$ 1.45864 ⁸⁸ $n_{H_\beta}^{15.65}$ 1.46434 ⁸⁵ $n_{H_\gamma}^{15.65}$	$[\alpha]_D^{30} = +37.69^\circ$ ¹⁰² $[\alpha]_D^{25} = +35.54^\circ$ ⁸⁷

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<i>l</i>-1-Methyl-4-isopropyl-[0,1,3]^(4,6)-bicyclohexene-1 (α-Thujene)		152 to 152.3 ¹¹⁰ 151 to 153 ¹⁰⁰ 151 to 152.5 ¹⁰⁰ 151 ¹¹² @ 759mm	0.8263 ¹⁰⁹ 0.8275 ^{109, 110} 0.8301 ¹¹²	1.45022 ¹⁰⁹ 1.45042 ^{109, 110} 1.45150 ¹¹²	$[\alpha]_D^{20} = -4.23^\circ$ ¹⁰⁹ $[\alpha]_D^{20} = -8.23^\circ$ ¹¹⁰ $[\alpha]_D^{20} = -37.20^\circ$ ¹¹²
<i>d</i>-3-Methyl-6-isopropyl-[0,1,3]^(4,6)-bicyclohexene-1 (β-Thujene)		147.5 to 149.5 ⁶⁸ 150 to 151 ¹¹⁰ @ 750mm 147 ¹¹² @ 739mm	0.8232 ¹¹⁰ @ 22° 0.8208 ¹¹² 0.8248 ¹¹⁰ 0.8220 ⁶⁸ @ 16°	1.44842 ¹¹⁰ @ 22° 1.44708 ¹¹² 1.44809 ⁶⁸ @ 16°	$[\alpha]_D = +109.90^\circ$ ⁶⁸ $[\alpha]_D = +110.780^\circ$ ¹¹²
 C₇H₁₀ [1,2,2]^(3,6)-Bicycloheptene-1 (Norbornylene)	51 to 53 ⁵⁴				
					

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
4-Methyl-[1,2,2]^(3,6)-bicycloheptene-1 (1-Methylnorcamphene-4) 		115.5 to 117 ¹²⁰ @ 750mm	0.8668 ¹²⁰ @ 18°	1.4606 ¹²⁰ @ 18°	
C₈H₁₄ 3,3-Dimethyl-[1,2,2]^(1,4)-bicycloheptene-1 (Camphenilene) 	26.5 ¹⁰⁴	138 to 140 ¹⁰⁴ 142 ⁴⁹	0.8699 ¹⁰⁴ @ 21°	1.4676 ¹⁰⁴ @ 21°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,2-Dimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 (Santene) 		140 to 142 ^{5,94} 140 to 141 ⁵⁹ 139 to 140 ⁷⁷ 136 to 140 ⁶⁹ 38 to 39 ²⁰ @ 15mm	0.863 ²⁰ 0.865 ²⁰ 0.8700 ⁵⁹ @ 17° 0.8720 ⁹⁴ @ 17° 0.8664 ⁹⁴ @ 16° 0.8698 ⁵ @ 15° 0.871 ⁶⁹ @ 15° 0.8710 ⁷⁷ @ 15° 0.8657 ⁵ D ₁₅ ¹⁵ 0.8680 ⁹⁴ @ 14°	1.46539 ²⁰ 1.4663 ²⁰ 1.4688 ⁵ @ 17.5° 1.4699 ⁵ @ 17.5° 1.4657 ⁹⁴ @ 17° 1.46758 ⁵⁹ @ 17° 1.4676 ⁹⁴ @ 16° 1.4710 ⁹⁴ @ 14°	
α-Santene		140 ⁷⁷	0.870 ⁷⁷ @ 15°		
4,4-Dimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 (Apoisofenchene) 	24.5 to 25 ⁵⁵	134.5 to 135.5 ⁵⁵ @ 762mm 140 to 142 ⁵⁶ 136 to 138 ⁵⁵	0.8607 ⁵⁵ @ 26° 0.8631 ⁵⁶ 0.8642 ⁵⁶	1.45764 ⁵⁵ @ 26° 1.46111 ⁵⁶ 1.46023 ⁵⁵	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
7,7-Dimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 (Apobornylene) 	36 to 37 ⁶³ 38 ⁷³	135 to 140 ⁵⁶ 138 ⁷³ 130 to 132 ⁵⁶ @ 742mm	0.8543 ⁵⁶	1.45374 ⁷³ @ 38.7° 1.45942 ⁵⁶ 1.45151 ⁷³ <i>n</i> _{H_a} ^{20,7} 1.45998 ⁷³ <i>n</i> _{H_β} ^{20,7} 1.46881 ⁷³ <i>n</i> _{H_γ} ^{20,7}	
7,7-Dimethyl- [1,1,3]^(4,6)-bicyclo- heptene-1 (Apopinene) 		140 ⁵⁸	0.870 ⁵⁸	1.46700 ⁵⁸	

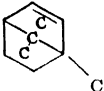
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,4,4-Trimethyl- [0,1,4]^(3,8)-bicyclo- heptene-1 (Carene or Pinonene) <div>  </div>		172 to 173 ³ 167 to 170 ⁴ 165.5 to 167 ⁷⁶ @ 707mm 165 to 170 ⁷⁶ @ 685mm 64 @ 29mm ⁸⁷	0.8441 ⁸⁷ @ 30° 0.8552 ⁷⁶ D_{30}^{20} 0.8594 ¹⁰⁰ D_{27}^{27} 0.8568 ³ @ 21° 0.8561 ⁴	1.4717 ⁸⁷ @ 30° 1.4731 ⁷⁶ @ 30° 1.47536 ⁴	$[\alpha]_D^{21} = +15.21^\circ$ ³ $[\alpha]_D^{20} = +62.2^\circ$ ⁷⁶ $[\alpha]_D^{20} = +5.37^\circ$ ⁴ $[\alpha]_D = +82.64^\circ$ ⁸⁷
1,5,5-Trimethyl- [0,1,4]^(4,8)-bicyclo- heptene-1 (Carene or Isodiprene) <div>  </div>		170 ²¹ 165 to 172 ⁹⁹ 163 to 167 ⁴ 168 to 169 ¹⁰⁰ @ 705mm 123 to 124 ¹⁰⁰ @ 200mm 60 @ 30mm ⁸⁷	0.8586 ¹⁰⁰ D_{30}^{20} 0.8575 ⁸⁷ @ 25° 0.8571 ⁴ 0.8563 ⁹⁹ 0.861 ⁴ D_{20}^{20} 0.8610 ⁴ @ 18° 0.8668 ²¹ D_{16}^{16}	1.469 ¹⁰⁰ @ 30° 1.4737 ⁹⁹ 1.47009 ⁴ @ 18°	$[\alpha]_D = +14.45^\circ$ ⁹⁹

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<i>d</i>-1,7,7-Trimethyl- [1,1,3]-(4,6)-bicyclo- heptene-1				1.466₂	$[\alpha]_D = +53.75^\circ$ ⁷⁵ $[\alpha]_D = +51.52^\circ$ ⁹⁶
(<i>d</i> - α -Pinene)		156 to 157 ⁴³ @ 763mm	0.8542 ⁸⁷ @ 25°	1.4634 ⁴² @ 25°	$[\alpha]_D = +51.14^\circ$ ¹⁰⁶
		158.5 to 159 ⁸⁸	0.8543 ^{113*}	1.4635 ^{113*}	$[\alpha]_D = +48.85^\circ$ ²³
		156 to 156.5 ¹⁰⁵	@ 25° 0.8582 ⁴²	@ 25° 1.4645 ⁸⁷	$[\alpha]_D = +47.9^\circ$ ^{113*}
		156.0 to ⁹⁶ 156.1	@ 25° 0.8595 ⁸⁸	@ 25° 1.4608 ¹⁰⁵	$[\alpha]_D = +47.89^\circ$ ⁸⁷
		156 ³³	D_{25}^{20}	1.46565 ³³	$[\alpha]_D = +47.48^\circ$ ⁴³
		155 to 159 ⁷⁵	0.8584 ¹⁰⁵	1.4663 ^{79, 106}	
		155 to 1.106, 107.	0.8585 ^{3, 20}	1.470 ⁷⁵	$[\alpha]_D = +33.37^\circ$ ³
		156 ^{108, 113}	0.8591 ¹⁰⁶	1.46634 ⁸	$[\alpha]_D = +15.47^\circ$ ⁸⁸
		155 ¹⁷	0.8597 ⁷⁹	@ 18.05°	
		154.5 to 155 ⁷⁹	0.8624 ⁸⁸	1.4663 ⁴³	$[\alpha]_D^{18} = +45.04^\circ$ ³⁰
		156.4 to 156.6 ⁸	D_{20}^{20} 0.8594 ⁸	@ 15° 1.4684 ⁹⁶	$[\alpha]_D^{17.6} = +41.32^\circ$ ⁸
		@ 757mm	@ 18.05°	@ 15°	
		156 ³⁰ @ 753mm	0.8620 ^{23, 43} @ 15°	1.4685 ¹⁰⁸ @ 15°	Reference ²³ gives re- fractive indices for mercury lines.
		62 @ 30mm ⁸⁷	0.8631 ⁹⁶	1.46915 ¹⁷	
		44 @ 14mm ¹⁷	@ 15°	@ 14°	
		45 @ 12mm ³	0.8642 ³³ @ 15°	1.46929 ³⁰ @ 13.8°	*Average of four de- terminations on same sample.
			0.8643 ¹ @ 15°	1.4650 ²³ @ 12°	
			0.8654 ¹ @ 15°	1.46354 ⁸ $n_{H_a}^{18.05}$	$\frac{dn}{dt} = -0.00048/^\circ\text{C.}$ (15° to 25°)
			0.8658 ⁸⁸ D_{15}^{15}	1.47322 ⁸ $n_{H_\beta}^{18.05}$	
			0.8591 ¹⁷ @ 14°	1.47925 ⁸ $n_{H_\gamma}^{18.05}$	
			0.8694 ⁸⁸ D_{10}^{10}		
			0.8732 ⁸⁸ D_4^5		
			0.8740 ⁸⁸ @ 4°		
			0.8703 ¹⁷ @ 0°		
			0.8746 ³⁰ @ 0°		

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<i>l</i>-1,7,7-Trimethyl- [1,1,3]^(4,6)-bicyclo- heptene-1					$[\alpha]_D = -46.65^\circ$ ²³
(<i>l</i> - α -Pinene)					$[\alpha]_D = -43.4^\circ$ ²⁹
		156 to 157 ³²	0.8107 ⁹¹	1.44797 ¹⁵	$[\alpha]_D = -42.6^\circ$ ¹⁰⁶
		156 ⁹¹	@ 78.59°	@ 61.4°	
		155 to 156 ¹	0.8259 ¹⁵	1.45239 ¹⁵	$[\alpha]_D = -40.51^\circ$ ¹
		155 ²⁹	@ 61.4°	@ 53.2°	$[\alpha]_D^{19,6} = -34.01^\circ$ ⁸
		153.3 ²²	0.8277 ⁹¹	1.4625 ¹⁰⁰	$[\alpha]_D^{10} = -40.30^\circ$ ⁹¹
		157.1 to	@ 59.38°	@ 28°	
		157.4 ⁸	0.8327 ¹⁵	1.4648 ⁹¹	
		@ 757.5mm	@ 53.2°	@ 25°	
		153.5 to	0.8439 ⁹¹	1.4687 ⁸⁶	Reference ²² has re-
		154.5 ⁸⁶	@ 39.74°	1.46506 ¹⁵	fractive indices for
		@ 755mm		@ 24.1°	mercury lines.
		155.4 to	0.8525 ¹⁰⁰	1.46526 ¹⁵	
		155.8 ¹⁵	D_{27}^{27}	@ 23.5°	
		@ 748.9mm	0.8590 ⁸⁶	1.4606 ²⁹	
		153 to 154 ¹⁰⁰	0.8565 ¹⁵	1.4660 ³²	
		@ 700mm	@ 24.1°	1.4676 ¹⁰⁸	
			0.8570 ¹⁵	1.46803 ⁸	
			@ 23.5°	@ 16.25°	
			0.8582 ²²	1.4649 ²³	
			0.8587 ²⁹	@ 12°	
			0.8598 ^{15,106}	1.44523 ¹⁵	
			$n_{H_a}^{61,4}$		
			0.8597 ³²	1.44952 ¹⁵	
			D_{20}^{20}	$n_{H_a}^{51,2}$	
			0.8621 ⁸	1.46227 ¹⁵	
			@ 16.25°	$n_{H_a}^{24,1}$	
			0.8620 ²³	1.46252 ¹⁵	
			@ 15°	$n_{H_a}^{23,5}$	
			0.8654 ¹	1.46517 ⁸	
			@ 15°	$n_{H_a}^{16,26}$	
			0.8685 ⁹¹	1.47202 ¹⁵	
			@ 10°	$n_{H_\beta}^{23,5}$	
			0.8749 ²⁹	1.47509 ⁸	
			@ 0°	$n_{H_\beta}^{16,26}$	
			0.8767 ⁹¹	1.47779 ¹⁵	
			@ 0°	$n_{H_\gamma}^{23,5}$	
				1.48098 ⁸	
				$n_{H_\gamma}^{16,26}$	
				1.48122 ¹⁵	
				$n_{H_\delta}^{23,5}$	

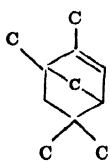
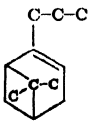
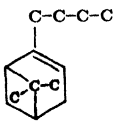
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
dl-1,7,7-Trimethyl- [1,1,3]^(4,5)-bicyclo- heptene-1					
(dl-α-Pinene)		155 to 156 ²⁸ @ 764mm	0.8108 ²⁸ @ 79.6°	1.46553 ¹¹⁵ @ 21°	
		159 to 161 ¹¹⁴	0.854 ¹¹⁵	1.4662 ⁷⁹	
		155 to 160 ¹⁴	@ 25°	1.4664 ¹⁰⁶	
		155 to 156 ^{106, 115}	0.858 ¹¹⁵ 0.8592 ¹⁰⁶	1.4662 ¹⁶ @ 17.5°	
		154.5 to 155 ⁷⁹ @ 754mm	0.8593 ⁷⁹ 0.8583 ¹⁸	1.43707 ²⁸ n _{H_a} ^{79.6}	
		153.5 to 154 ¹⁶ @ 750mm	@ 17.5° 0.8635 ²⁸ @ 16.2°	1.46324 ¹⁶ n _{H_a} ^{17.5}	
			0.8586 ³⁷ D ₁₅ ¹⁵	1.46736 ³⁸ n _{H_a} ^{16.2}	
			0.8638 ²⁸ @ 13.2°	1.46741 ²⁸ n _{H_a} ^{13.2}	
				1.44639 ²⁸ n _{H_β} ^{79.6}	
				1.47317 ¹⁶ n _{H_β} ^{17.5}	
				1.47631 ²⁸ n _{H_β} ^{16.2}	
				1.47741 ²⁸ n _{H_β} ^{13.2}	
				1.45192 ²⁸ n _{H_γ} ^{79.6}	
				1.48332 ²⁸ n _{H_γ} ^{16.2}	
				1.48341 ²⁸ n _{H_γ} ^{13.2}	

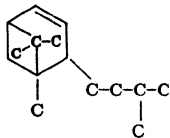
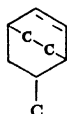
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (at 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
<i>d</i>-3,7,7-Trimethyl- [1,1,3]^(4,6)-bicyclo- heptene-1 (<i>d</i> - δ -Pinene) <div> </div>		156 to 159 ¹¹⁷ @ 748mm	0.8535 ¹¹⁷	1.46434 ¹¹⁷	$[\alpha]_D = +8.35^\circ$ ¹¹⁷
<i>l</i>-3,7,7-Trimethyl- [1,1,3]^(4,6)-bicyclo- heptene-1		156 to 158 ¹¹⁷ @ 758mm 157 ⁷⁹ @ 740.5mm	0.8604 ¹¹⁷ 0.8708 ⁷⁹	1.46672 ¹¹⁷	$[\alpha]_D = -6.22^\circ$ ¹¹⁷
<i>dl</i>-3,7,7-Trimethyl- [1,3,3]^(4,6)-bicyclo- heptene-1		157 to 159 ⁶⁰ @ 771mm	0.8636 ⁶⁰	1.46561 ⁶⁰	

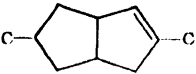
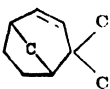
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<i>d</i>-3,7,7-Trimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 <i>(d</i> -Bornylene) 	109 to 109.5 ¹¹¹ 109 to 110 ¹¹¹	146 ¹¹¹ 146.5 ¹¹¹ @ 750mm			$[\alpha]_D = -19.29^\circ$ ¹¹¹ $[\alpha]_D = +19.33^\circ$ ¹¹¹
<i>l</i>-3,7,7-Trimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 <i>(l</i> -Bornylene)	113 ^{11,13,35} 113 to 114 ¹²	146 ³⁵ @ 750mm 145.6 to 146 ¹² @ 750mm 146 ¹¹ @ 745.5mm 146 ¹³ @ 740mm			$[\alpha]_D = -22.27^\circ$ ³⁵ $[\alpha]_D = -21.69^\circ$ ¹³ $[\alpha]_D = -18.45^\circ$ ¹² $[\alpha]_D^{19} = -23.94^\circ$ ¹¹
<i>dl</i>-3,7,7-Trimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 <i>(Bornylene)</i>	96 to 98 ³¹ 101.5 to 102.5 ³⁰ 103 ³⁶ 105 ¹⁸	149 to 150 ^{31,30}			

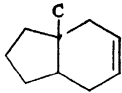
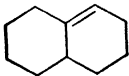
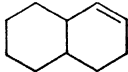
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
1,2,3-Trimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 (Methyl santene) <div> </div>		151 to 152 ⁶¹	0.8560 ⁶¹	1.45943 ⁶¹	
1,7,7-Trimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 (Isopinene) <div> </div>		154.5 to 155.5 ⁶	0.8658 ⁶	1.470253 ⁶	$[\alpha]_D = +2.61^\circ$ ⁶
3,5,5-Trimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 (δ -Fenchene, Isofenchene, Fenchylene, Isofenchylene) <div> </div>		139 to 140 ⁷⁸ @ 760mm 139 to 140 ⁶⁴ 138.5 to 141 ⁸⁹ 140.5 to ⁷⁸ 141.5 @ 740mm 140 to 141 ^{76,78} @ 740mm 66 to 70 ¹¹⁶ @ 20mm	0.8376 ⁸⁹ 0.8381 ⁷⁸ 0.8397 ⁶⁴ 0.8398 ⁸³ 0.842 ¹¹⁶ 0.8433 ⁶⁴	1.4505 ⁸⁹ @ 20.8° 1.4486 ⁶⁴ 1.4494 ⁷⁸ 1.4502 ⁸³ 1.4505 ⁷⁸ 1.47439 ¹¹⁶	$[\alpha]_D = -68.76^\circ$ ⁷⁸ $[\alpha]_D = -57.28^\circ$ ⁸³ $[\alpha]_D = -55.4^\circ$ ⁸⁹

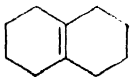
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
1,4,4-Trimethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 (γ-Fenchene) <div> </div>		146 to 148 ⁸⁶ 145 to 150 ⁸⁸ 145 to 147 ⁸⁴	0.854 ⁸⁸ 0.8547 ⁸⁴ @ 17° 0.855 ⁸⁵ @ 17°	1.461 ⁸⁸ 1.46072 ⁸⁴ @ 17° 1.461 ⁸⁵ @ 17°	
C₁₁H₁₈ 7,7-Dimethyl-1-ethyl- [1,1,3]^(4,6)-bicyclo- heptene-1 (Methyl myrtenyl) <div> </div>		95.5 to 96 ⁹² @ 62mm	0.8697 ⁹²		$[\alpha]_D^0 = +33.96^\circ$ ⁹²
1,2,3,6-Tetramethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 (1,4-Dimethylsantene) <div> </div>		161 to 162 ⁸²	0.8520 ⁸²	1.46073 ⁸²	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1,4,4,6-Tetramethyl- [1,2,2]^(3,6)-bicyclo- heptene-1 (Methyl- δ -Fenchene) <div>  </div>		160 to 162 ⁵³	0.85205 ⁵³	1.46261 ⁵³ @ 20.5°	
C₁₂H₂₀ 7,7-Dimethyl-1-propyl- [1,1,3]^(4,6)-bicyclo- heptene-1 (Ethyl myrtenyl) <div>  </div>		73 to 73.5 ⁹² @ 10mm	0.8663 ⁹²		[α] _D ⁰ = +21.97° ⁹²
C₁₃H₂₂ 7,7-Dimethyl-1-butyl- [1,1,3]^(4,6)-bicyclo- heptene-1 (Propyl myrtenyl) <div>  </div>		88 to 89 ⁹² @ 10mm	0.8624 ⁹²		[α] _D ⁰ = +21.63° ⁹²

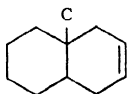
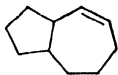
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
4,7,7-Trimethyl-3-(3-methylbutyl)-[1,1,3]^(4,6)-bicycloheptene-1 (Dihydrocaryophyllene) 		140 ⁹⁰ @ 24mm 126 ³⁰ @ 15mm 129 to 130 ¹⁹ @ 14mm 131 ¹⁰³ @ 11mm	0.8898 ¹⁹ @ 19° 0.8893 ³⁰ @ 18° 0.8965 ¹⁰³ @ 15°	1.49032 ¹⁹ 1.4885 ³⁰ @ 18° 1.496 ¹⁰³ @ 18° 1.4921 ⁹⁰ @ 16°	$[\alpha]_D = -25^\circ$ ¹⁹ $[\alpha]_D = -4.97^\circ$ ¹⁰³
C_8H_{12} [0,x,x]-Bicycloöctene		137.5 to 139 ¹¹⁹	0.891 ¹¹⁸ 0.9097 ¹¹⁹ @ 0°	1.48434 ¹¹⁸	
C_9H_{14} 4-Methyl-[2,2,2]^(3,6)-bicycloöctene-1 		147.5 to 149 ⁵¹ @ 756.7mm	0.8955 ⁵¹ @ 17°	1.4763 ⁵¹ @ 17°	

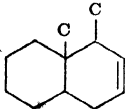
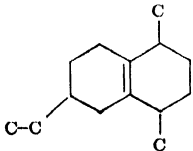
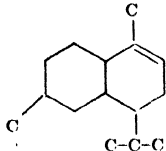
<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. (@ 760mm)</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
2,5-Dimethyl-[0,3,3]-bicyclooctene-1 		167 ⁵⁰	0.8605 ⁵⁰ @ 24°	1.4649 ⁵⁰ @ 24°	
2,6(?) -Dimethyl-[0,3,3]-bicyclooctene-2		54 to 60 ⁵⁰ @ 20mm	0.8632 ⁵⁰	1.4663 ⁵⁰	
3,3-Dimethyl-[1,2,3]^(4,7)-bicyclooctene-1 (Endocamphene) 		170.6 to 171.6 ⁷⁴ @ 744.5mm	0.8957 ⁷⁴ @ 12.4°	1.48442 ⁷⁴ @ 12.4°	

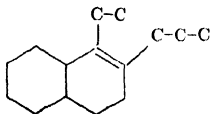
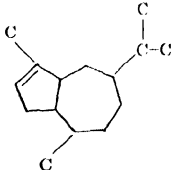
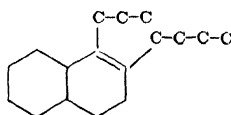
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methyl-[0,3,4]-bicyclononene-3 (8-Methylhexahydroindene) 		175 to 176 ²⁷ @ 761mm	0.8879 ²⁷ @ 16.5°	1.4825 ²⁷ @ 16.5°	
[0,4,4]-Bicyclodecene-1 (Δ ¹ -Octalin) 		194 ²⁵ @ 771mm 189 ²⁵ @ 768mm 197 to 199 ⁴⁸	0.9009 ²⁵ 0.9090 ²⁵ 0.9103 ⁴⁸ 0.9105 ⁴⁶ @ 19.7°	1.48504 ²⁵ n _{H_a} ²⁰ 1.49124 ²⁵ n _{H_a} ²⁰ 1.49525 ²⁵ n _{H_β} ²⁰ 1.50138 ²⁵ n _{H_β} ²⁰ 1.50126 ²⁵ n _{H_γ} ²⁰ 1.50752 ²⁵ n _{H_γ} ²⁰	
[0,4,4]-Bicyclodecene-2 (trans-β-Octalin) 		185 ⁴⁶	0.893 ⁴⁴ 0.8970 ⁴⁶ @ 15.6°	1.4841 ⁴⁴	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
[0,4,4]-Bicyclodecene-2 (<i>cis</i> -β-Octalin)		76 to 78 ¹⁰ @ 15mm 72 to 73 ¹⁰ @ 12mm	0.915 ¹⁰ @ 22° 0.909 ¹⁰	1.4959 ¹⁰ @ 22° 1.4902 ¹⁰	
[0,4,4]-Bicyclodecene-2		190 to 192 ⁷¹	0.901 ⁷¹ @ 13° 0.910 ⁷¹ @ 0°	1.491 ⁷¹ @ 13°	
[0,4,4]-Bicyclodecene-(1,6) (<i>trans</i> -Octalin) 		190 ⁸⁷ 186 to 188 ⁸²	0.8723 ⁸² @ 25° 0.8936 ⁴⁴ @ 19°	1.4719 ⁸² @ 25° 1.48429 ⁴⁴ @ 19.5°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
[0,4,4]-Bicyclodecene- (1,6)	-34 ⁴⁵	190 to 191 ⁷⁰ 189 ¹²¹ 194 to 196 ⁴⁵ @ 749mm 88 to 89 ³¹ @ 19mm 88 to 89 ³² @ 14mm 79 @ 14mm ⁴⁵	0.8987 ¹²¹ @ 22.5° 0.8968 ¹²¹ @ 21° 0.8170 ⁴⁵ @ 20.0° 0.9205 ³¹ 0.9200 ³² 0.914 ⁷⁰ @ 17° 0.931 ⁷⁰ @ 0°	1.4867 ¹²¹ @ 22.5° 1.4851 ¹²¹ @ 21° 1.4976 ³¹ 1.4979 ³² 1.4993 ⁷⁰ @ 17°	
<i>trans</i> -[0,3,5]-Bicyclo- decene-2		63.5 ⁴⁷ @ 8mm	0.8996 ⁴⁷ @ 21.0°	1.48711 ⁴⁷ _{<i>n</i>_D^{21.3}}	
C ₁₁ H ₁₈ 1-Methyl-[0,4,4]- bicyclodecene-3		84 to 86 ³⁹ @ 14mm 82 ³⁸ @ 14mm 78 to 80 ⁷² @ 12mm	0.9074 ⁷² @ 16.2° 0.9098 ⁷² @ 16° 0.9085 ³⁸ @ 15.2° 0.9053 ³⁹ @ 15°	1.4916 ⁷² @ 16.2° 1.4956 ⁷² @ 16° 1.4943 ³⁸ @ 15.2° 1.4939 ³⁹ @ 15°	



Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Methyl-[0,4,4]- bicyclodecene-x		78 to 80 ° @ 13mm			
C₁₂H₂₀ 1,2-Dimethyl-[0,4,4]- bicyclodecene-3		98 to 103 ° @ 12mm 95 to 99 ° @ 10mm	0.9121 ° @ 16.7° 0.9153 ° @ 16.4°	14975 ° @ 16.7° 1.4974 ° @ 16.4°	
					
C₁₄H₂₄ 2,5-Dimethyl-8-ethyl- [0,4,4]-bicyclodecene- (1,6)		247 to 248 °			
					
C₁₆H₂₆ 2,8-Dimethyl-5-iso- propyl-[0,4,4]-bicyclo- decene-2 (Dihydrocadinene)		102 to 106 ° @ 4mm	0.8944 ° @ 25°	1.4915 ° @ 25°	
					

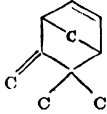
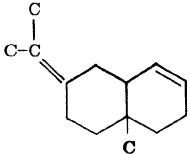
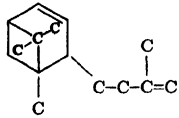
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Ethyl-3-propyl-[0,4,4]-bicyclodecene-2 (1,2,4a,5,6,7,8,8a-Octa- hydro-3- <i>n</i> -propyl-4- ethylnaphthalene) 		89 to 90 ⁸⁴ @ 2mm	0.8913 ⁸⁴	1.4838 ⁸⁴	
6,10-Dimethyl-3-isopropyl-[0,3,5]-bicyclodecene-9 (Octahydroguaiiazulene) 		123 to 125 ⁹⁵ @ 11mm	0.8872 ⁹⁵	1.4834 ⁹⁵	
C₁₇H₃₀ 2-Propyl-3-butyl-[0,4,4]-bicyclodecene-2 (1,2,4a,5,6,7,8,8a-Octa- hydro-3- <i>n</i> -butyl-4- <i>n</i> -pro- pylnaphthalene) 		109 to 110 ⁸⁴ @ 2mm	0.8849 ⁸⁴	1.4830 ⁸⁴	

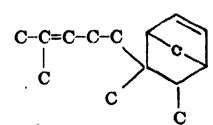
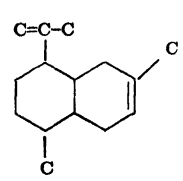
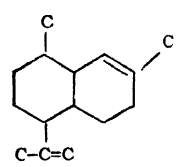
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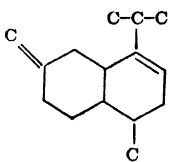
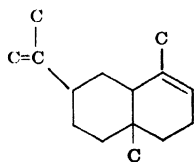
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2. BICYCLENES WITH AN ALKENYL SUBSTITUTION, C_nH_{2n-6}

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
5-Methylene-4,4-dimethyl-[1,2,2]-(3,6)-bicycloheptene-1 (Isocamphodiene) 	41.5 to 42 °	149 to 150 ° @ 763mm			
C ₁₄ H ₂₂ 6-Methyl-9-isopropylidene-[0,4,4]-bicyclocdecene-2 		125 to 126 ° @ 12mm	0.9124 ° @ 18°	1.5065 ° @ 18°	
C ₁₅ H ₂₄ 4,7,7-Trimethyl-3-(3-methylbuten-3-yl)-[1,1,3]-(4,6)-bicycloheptene-1 (β-Caryophyllene) 		258 to 259 ° @ 752mm 136 to 137 ° @ 20mm 129 to 130 ° @ 14mm 136 to 137 ° @ 10mm 119 to 120 ° @ 9mm	0.9038 ° @ 24° 0.9032 ° 0.9030 ° D ₂₀ ²⁰ 0.9076 ° @ 15°	1.49976 ° 1.50076 ° 1.49694 ° n _{H_a} ²⁰ 1.50830 ° n _{H_β} ²⁰ 1.51528 ° n _{H_γ} ²⁰	[α] _D ²⁰ = -8.959° ° [α] _D ²⁰ = -8.95° ° [α] _D ²⁰ = -8.5° to 9.5° °

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
4,5-Dimethyl-5-(4-methylpenten-3-yl)-[1,2,2]-(3,6)-bicycloheptene-1 (β-Santalene) 		263 to 264 ° 125 to 126 ° @ 7mm	0.8940 ¹² 0.9139 ° @ 0°	1.49460 ¹²	$[\alpha]_D = -41.3^\circ$ ¹²
3,7-Dimethyl-10-isopropenyl-[0,4,4]-bicyclodecene-3 (Micranene) 		266 to 268 ° 126 to 128 ° @ 5mm	0.9155 ° @ 30°	1.5050 ° @ 30°	$[\alpha]_D^{25} = -2.41^\circ$ °
3,10-Dimethyl-7-isopropenyl-[0,4,4]-bicyclodecene-2 (Isozingiberene)* 		138 @ 20mm ° 130 to 135 ° @ 14mm 120 to 123 ° @ 8mm 118 to 122 ° @ 7mm	0.9070 ° 0.9118 ¹⁴ 0.9150 ¹⁴ 0.910. ° @ 15°	1.5030 ° 1.506 ° 1.5062 ¹⁴ 1.5034 ¹⁴	$[\alpha]_D^{30} = -51.36^\circ$ ¹⁴ $[\alpha]_D = -41^\circ$ ¹⁴ *Correct structure of this seems to be 3,7-Dimethyl-5-isopropenyl-[0,4,4]-bicyclodecadiene-2,8. See Simonsen, "The Terpenes," p. 498, Cambridge Press, London, 1932.

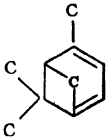
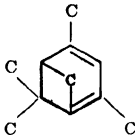
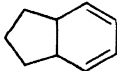
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
9-Methylene-5-methyl-2-isopropyl-[0,4,4]-bicyclodecene-2 (γ-Cadinene) 		266 ⁴	0.9089 ⁴ @ 30°	1.5021 ⁴ @ 30°	
2,6-Dimethyl-9-isopropenyl-[0,4,4]-bicyclodecene-2 (α-Selinene) 		268 to 272 ¹¹ 133 to 134.5 ¹⁰ 128 to 132 ¹⁵ @ 11mm	0.9190 ¹⁵ 0.9196 ¹¹ 0.9232 ¹¹ @ 15° 0.9203 ¹⁰ @ 13°	1.5048 ¹¹ 1.50920 ¹⁵ 1.5075 ¹⁰ @ 13°	[α] _D = -61.6° ¹⁵ [α] _D = +49.5° ¹¹ [α] = +32° ¹⁰

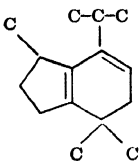
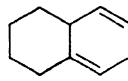
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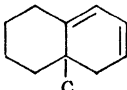
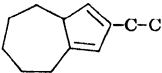
XIII. BICYCLODIENES OR BICYCLODIOLEFINS

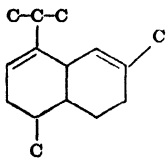
483
BICYCLODIENES

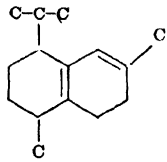
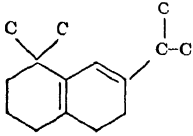
$C_{10}H_{14}$

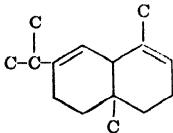
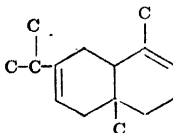
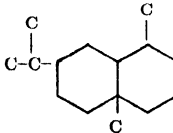
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
1,5,5-Trimethyl- [1,1,3]^(4,6)-bicyclo- heptadiene-1,3 (Verbenene) <i>l</i> 		159 to 160 ° @ 758mm 158 to 159 ° @ 749mm 158 to 159 ° @ 745mm 45 @ 11mm °	0.8822 ° 0.8852 ° @ 15° 0.885 ° @ 15° 0.8866 ° @ 15°	1.49800 ° 1.49855 °	$[\alpha]_D = -71.6^\circ$ ° $[\alpha]_D = -100.61^\circ$ °
<div style="text-align: right;"><i>d</i></div>		158 to 159 ° @ 745mm	0.8867 ° @ 15°	1.49800 °	$[\alpha]_D = +100.71^\circ$ °
1,3,5,5-Tetramethyl- [1,1,3]^(4,6)-bicyclo- heptadiene-1,3 (Methyl verbenene)		175 to 176 ° @ 771mm 49 @ 8mm °	0.872 ° 0.876 ° @ 15°	1.4969 °	
					
C_9H_{12} [0,3,4]^(1,6)-Bicyclo- nonadiene-2,4 		171 to 172 ° @ 757mm	0.9274 ° @ 16.5°	1.5153 ° @ 16.5°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. (at 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
2-Isopropyl-5,5,9-trimethyl-[0,3,4]^(1,6)-bicyclononodiene-2,(6,10) (Guaiene) 	31.5 °				
C₁₀H₁₄ [0,4,4]-Bicyclo-decadiene-2,5 		75 to 76 ° @ 8mm	0.9726 °	1.5322 °	
[0,4,4]-Bicyclo-decadiene-x,x		199.5 to 200 ° 197 ° 195 °	0.934 ° D ₀ ²⁰ 0.95807 ° @ 18.4 ° 0.94887 ° @ 16.4 ° 0.9419 ° @ 0 ° 0.952 ° D ₀ ⁰	1.52618 ° @ 16.4 ° 1.52879 ° n _{H_a} ^{18.4} 1.52215 ° n _{H_a} ^{16.4} 1.54397 ° n _{H_β} ^{18.4} 1.53648 ° n _{H_β} ^{16.4} 1.55340 ° n _{H_γ} ^{18.4} 1.54555 ° n _{H_γ} ^{16.4}	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
6-Methyl-[0,4,4]-bicyclodecadiene-1,3 		172 ¹⁴ @ 12mm			
C₁₂H₁₈ 3-Ethyl-[0,3,5]-bicyclodecadiene-2,4 		109 to 111 ³⁰ @ 10mm		1.5252 ³⁰	
1,4-Dimethyl-[0,4,4]-bicyclodecadiene-x,x (1,4-Dimethyl-hexahydronaphthalene)			0.92194 ²⁰ @ 19.8°	1.50902 ²⁰ @ 19.8° 1.50547 ²⁰ n _{D_a} ^{19.8} 1.51790 ²⁰ n _{D_β} ^{19.8}	
C₁₄H₂₂ 1,2,4,5-Tetramethyl-[0,4,4]-bicyclodecadiene-x,x (1,2,4,5-Tetramethylhexahydronaphthalene)		89 to 91 ³³ @ 0.6mm	0.926 ³³ D ₂₀ ²⁰	1.5095 ³³	

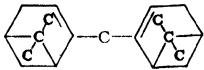
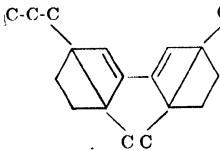
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<i>d</i>-3,7-Dimethyl-10-isopropyl-[0,4,4]-bicyclodecadiene-2,9					$[\alpha]_D^{20} = +103.7^\circ$ ³²
(Cadinene)					$[\alpha]_D^{20} = +48.12^\circ$ ¹⁰
		274 to 275 ¹⁰	0.9225 ³¹	1.5065 ³²	$[\alpha]_D^{20} = +47.92^\circ$ ¹⁰
		273 to 275 ¹⁰	0.9255 ³²	1.5094 ¹⁰	
		272 to 274 ³²	0.9193 ¹³	1.5107 ¹⁰	$[\alpha]_D = +55^\circ$ ³¹
		260 to 261 ⁷	@ 15°	1.5108 ⁷	$[\alpha]_D = +50^\circ$ ⁷
		269 ³¹	0.9224 ¹⁰	1.5065 ¹³	
		@ 750mm	@ 15°	@ 15°	$[\alpha]_{44.1}^{15} = +11.68^\circ$ ¹³
		153 to 154 ⁷	0.9247 ⁷		
		@ 26mm	@ 15°		
		129 to 131 ¹³			
		@ 10mm			
<i>l</i>-3,7-Dimethyl-10-isopropyl-[0,4,4]-bicyclodecadiene-2,9					$[\alpha]_D = -130.0^\circ$ ¹¹
					$[\alpha]_D = -116.73^\circ$ ²⁷
		274 to 275 ³⁵	0.9183 ²⁵	1.50858 ²⁵	$[\alpha]_D = -110.96^\circ$ ¹⁷
		272 to	@ 22°	@ 22°	
		275 ^{31,27,34}	0.918 ¹⁵	1.50647 ³⁵	$[\alpha]_D = -105.5^\circ$ ²¹
		272 ¹⁵	0.9183 ¹⁷	1.5065 ^{15,21}	$[\alpha]_D = -98.56^\circ$ ³⁵
		271 to 272 ¹⁷	0.9185 ¹¹	1.50651 ²⁷	
		135 to 137 ⁸	0.9293 ⁸	1.5073 ¹⁷	$[\alpha]_D = -79^\circ$ ²⁵
		@ 15mm	@ 18°	1.5074 ¹¹	
		140 to 142 ⁸	0.9229 ²⁷	1.5070 ¹	$[\alpha]_D = -74.6^\circ$ ¹
		@ 11mm	@ 15°	@ 15°	
		135 ¹	0.9298 ¹	1.5096 ³	$[\alpha]_D = -68.38^\circ$ ⁸
		@ 11mm	@ 15°	@ 13°	
		134 to 136 ¹¹	0.9246 ⁸		$[\alpha]_D = -30.82^\circ$ ³
		@ 11mm	D_{15}^{15}		
		127 to 128.5 ²⁵			
		@ 6mm			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,7-Dimethyl-10-isopropyl-[0,4,4]-bicyclo-decadiene-2,(1,6) (Isocadinene) 		124 to 128 ¹² @ 12mm 124 to 126 ¹¹ @ 11mm	0.9181 ¹² 0.9154 ¹¹	1.5158 ¹¹ 1.5150 ¹²	$[\alpha]_D = -1.0^\circ$ ¹¹
10,10-Dimethyl-3-isopropyl-[0,4,4]-bicyclo-decadiene-2,(1,6) (Bicycloisoprenemyrcene) 		130 to 134 ²² @ 13mm	0.9136 ²² @ 21°	1.5051 ²² @ 21°	

Name and Carbon Skeleton	M., P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,6-Dimethyl-9-iso-propyl-[0,4,4]-bicyclo-decadiene-2,9 or -2,8 (δ- or ε-Selinene)  δ-form or  ε-form		130 ²⁹ @ 12mm	0.9234 ²⁹ @ 14°	1.5167 ²⁹ @ 14°	$[\alpha]_D = +194.3^\circ$ ²⁹
Eudesmene (Position of double bonds unknown) 		132 to 136 ²⁴ @ 15mm 128 to 132 ²³ @ 12mm 129 to 132 ²⁸ @ 10mm 122 to 124 ²⁶ @ 7mm 121 to 123 ²⁸ @ 6mm	0.9232 ²⁸ 0.9214 ²³ 0.9204 ²⁸ 0.91964 ²⁶ 0.9175 ²⁴	1.50987 ²⁴ 1.50874 ²⁶ 1.50738 ²⁸ 1.5125 ²³ 1.5134 ²⁴ @ 19°	$[\alpha]_D = +54.1^\circ$ ²⁶ $[\alpha]_D = +52.6^\circ$ ²⁴ $[\alpha]_D^{20} = +51^\circ$ ²⁸ $[\alpha]_D^{20} = +49^\circ$ ²⁸

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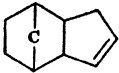
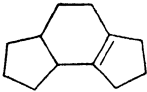
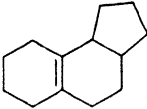
XIV. DIBICYCLENES OR DIBICYCLOÖLEFINS, C_nH_{2n-10}

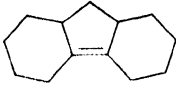
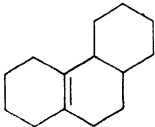
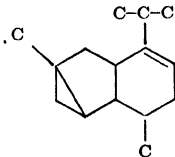
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D_4^{20}	n_D^{20}	Additional Data
<p>Di-(7,7-dimethyl- [1,1,3]^(4,6)-bicyclohepten- 1-yl)-methane</p> <p>(Dimyrtenyl)</p> 		173 to 174 ° @ 10mm	0.9521 °		$[\alpha]_D^0 = +13.793^\circ$ °
<p>$C_{20}H_{30}$</p> <p>Pinaconene</p> 	55 to 56 ¹		0.93046 ° @ 61°	1.50233 ° @ 61°	

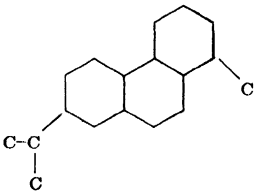
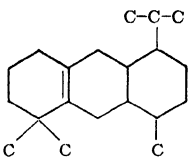
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XV. POLYCYCLENES, C_nH_{2n-6}


Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Dihydrodicyclopentadiene 	47^{17} 50 to 51^2	178^3 @ 766mm 67 to 68^{17} @ 14mm 78 to 80^{18} @ 13mm			
$C_{12}H_{18}$ 6,7-Cyclopentano- [0,3,4]-bicyclononene- (1,5) (1,2,3,3a,4,5,6,7,8,8b-Deca- hydro-as-indacene)		107 to 108^6 @ 17mm	0.9397^6	1.4990^6	
					
$C_{13}H_{20}$ 2,3-Cyclopentano- [0,4,4]-bicyclodecene- (1,6) (1,2,3,4,5,6,7,8-Octahydro- 1,2-cyclopentano- naphthalene)		74 to 76^8 @ 3mm	0.9513^8	1.5074^8	
					

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Decahydrofluorene 		258 to 259 ¹¹ @ 745mm 258 ¹³ @ 737mm 254 ⁴ @ 727mm	1.012 ¹³	1.5060 ¹³	
C₁₄H₂₂ Δ¹¹-Dodecahydrophe- nanthrene 		268 to 269 ¹² @ 737mm 81 to 82 ⁸ @ 1.5mm	0.964 ¹² 0.9674 ⁸	1.5098 ⁷ 1.5102 ⁸ 1.5119 ¹²	
C₁₅H₂₄ Copaene 		246 to 251 ¹⁰ 119 to 120 ¹⁴ @ 10mm	0.9077 ¹⁰ @ 15°	1.48943 ¹⁰	[α] _D = -13.21° ¹⁰

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Dodecahydrotene (Double bond position not indicated) 		336 ° 148 to 150 ^{1,16} @ 10mm	0.8985 ^{1,16}	1.48510 ^{1,16}	
C₂₀H₃₄ 7,7-Dimethyl-3,4- (5-methyl-2-isopropyl- cyclohexano)-[0,4,4]- bicyclodecene-(1,6) (1,2,3,4,4',5,6,7,8,9,9',10- Dodecahydro-1-isopropyl- 4,5,5-trimethylanthracene, Tricyclic camphorene dihydride)		176 ° @ 12mm	0.9410 ° @ 14°	1.5118 ° @ 14°	
					


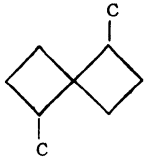
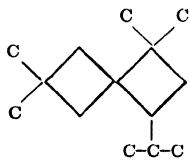
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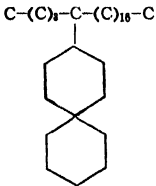
XVI. CYCLYNES OR CYCLOACETYLENES, C_nH_{2n-4}


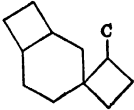
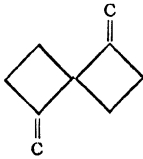
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
Cycloheptyne-1 (Suberoterpene) 		120 to 121 ¹			
C₁₅H₂₆ Cyclopentadecyne		158 to 159 ^{1,2} @ 14mm	0.8843 ^{1,2} @ 21°	1.4910 ^{1,2} @ 21°	
C₁₇H₃₀ Cycloheptadecyne		127 to 128 ² @ 0.25mm	0.8840 ² @ 22°	1.4869 ² @ 22°	

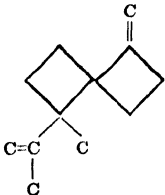
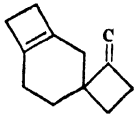
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XVII. SPIRO-HYDROCARBONS

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
C_nH_{2n-2} Cyclopropane-spiro- cyclopropane 		39.5 to 40.5 ° @ 746mm	0.7266 °	1.4120 °	
C₉H₁₆ 1,5-Dimethyl-cyclo- butane-spiro-cyclo- butane 		132 ° @ 756mm	0.7972 ° @ 20.0°	1.43459 ° @ 20.0°	
C₁₄H₂₆ 1,1,6,6-Tetramethyl-3- isopropyl-cyclobutane- spiro-cyclobutane 		116 to 118 ° @ 23mm	0.8380 ° @ 20.0°	1.46362 ° @ 19.9°	

<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
Cyclopentane-spiro-cyclopentane 		60 @ 12mm ²			
C₁₀H₁₈ Cyclopentane-spiro-cyclohexane 		185 to 186 ° @ 745mm 75 @ 20mm ³	0.8877 ⁸	1.4748 ⁸	
C₃₃H₆₄ 5-(Cyclohexane-spiro-cyclohexyl)-docosane 			0.867 ⁵ @ 25°	1.4793 ⁵ @ 25°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>C_nH_{2n-4}</p> <p>[0,1,3]^(6,10)-Bicyclohexane-spiro-cyclopentane</p> 		189 to 190 ° @ 764.5mm	0.9134 ° @ 17°		
<p>C₁₂H₂₀</p> <p>1-Methyl-[0,2,4]^(7,10)-bicyclooctane-spiro-cyclobutane</p> 		77 to 78 ° @ 13.5mm	0.8679 ° @ 20.0°	1.46809 ° @ 20.0°	
<p>C_nH_{2n-6}</p> <p>C₉H₁₂</p> <p>1,5-Dimethylene-cyclobutane-spiro-cyclobutane</p> 		135 ° @ 774mm 70.5 ° @ 90mm 38 ° @ 21mm	0.8264 ° @ 20.0°	1.48064 ° @ 20.0°	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
1-Methylene-5-methyl-5-isopropenyl-cyclobutane-spiro-cyclobutane 		101 ° @ 10mm	0.9346 ° @ 20.0°	1.52624 ° @ 20.0°	
C_nH_{2n-8} C₁₂H₁₆ 1-Methylene-[0,2,4]-(7,10)-bicyclo-octene-7,10-spiro-cyclobutane 		72 to 74 ° @ 9mm	0.8955° @ 20.0°	1.50301 ° @ 20.0°	

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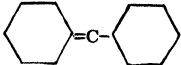
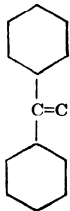
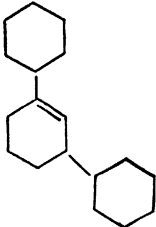
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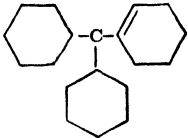
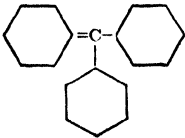
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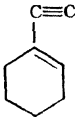
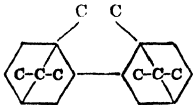
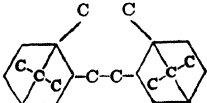
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XVIII. HYDROCARBONS OF KNOWN BUT UNCLASSIFIED STRUCTURE


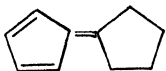
XVIII. HYDROCARBONS OF KNOWN BUT UNCLASSIFIED STRUCTURE

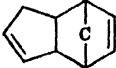
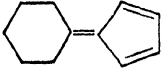
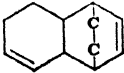
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
C_nH_{2n-4} Cyclohexylcyclohexylidenemethane 		133 ¹² @ 20mm 111 to 112 ⁵ @ 12mm	0.8972 ⁵ 0.919 ¹² @ 0°	1.4908 ⁵	
$C_{14}H_{24}$ 1,1-Dicyclohexylethene 		140 @ 18mm ¹⁴			
C_nH_{2n-6} $C_{18}H_{30}$ 1,3-Dicyclohexylcyclohexene-1 		204 to 207 ¹³ @ 15mm			

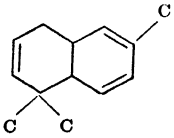
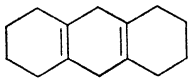
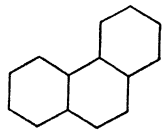
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>C_nH_{2n-6}</p> <p>1,4-Dicyclohexylcyclohexene-1</p> <p>(Hexadecahydroterphenyl)</p> 	111 to 113 ²	190 ² @ 13mm			
<p>C₁₉H₃₂</p> <p>Dicyclohexylcyclohexen-1-ylmethane</p> 	41 ¹⁰				
<p>Dicyclohexylcyclohexylidenemethane</p> 		175 ¹⁰ @ 10mm			

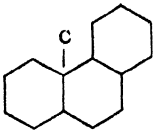
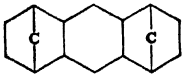
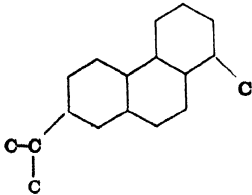
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
C_nH_{2n-6} 1-Ethynylcyclohexene-1 		148 to 151 ¹ 145 to 146 ⁹ 40 to 43 ³ @ 12mm	0.8800 ⁹	1.4922 ¹ 1.4978 ⁹	
C₂₀H₃₄ 2,7,7-Trimethyl- 1-(2,7,7-trimethyl- [1,2,2]-(3,6)- bicycloheptyl)- [1,2,2]-(3,6)-bicyclo- heptane					[α] _D = +28.47° ⁶ [α] _D = +15.56° ⁴
(Bis-[2,7,7-trimethyl-[1,2,2]- bicyclo]-heptyl)	94 ⁸ 85 to 87 ⁹ 75 ⁴ 74 to 75 ⁷	326 to 327 ⁴ 322 to 323 ⁷ 321 to 323.6 ⁸ 188 to 190 ⁷ @ 12mm	1.001 ⁴ @ 15° (solid)		
					
C_nH_{2n-6} C₂₂H₃₈ 1,2-Dicamphane ethane					
		205 to 208 ¹¹ @ 11mm			

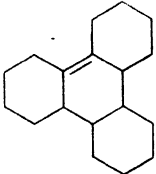
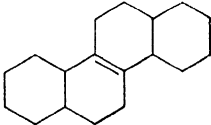
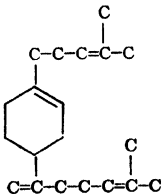
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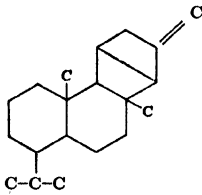
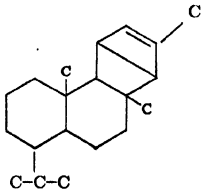
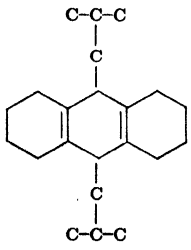
<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₈H_{2n-8} Cycloöctatetraene 	- 27 ⁴³ approx.	42.2 to 42.4 ⁴⁴ @ 17mm 36.2 to 36.4 ⁴⁴ @ 14mm	0.925 ⁴⁴ 0.923 ⁴³ 0.920 ⁴³ 0.943 ⁴⁴ @ 0°	1.53944 ⁴³ 1.54225 ⁴³ 1.5389 ⁴⁴ 1.53413 ⁴³ <i>n_{H_a}²⁰</i> 1.53659 ⁴³ <i>n_{H_a}²⁰</i> 1.55377 ⁴³ <i>n_{H_β}²⁰</i> 1.55759 ⁴³ <i>n_{H_β}²⁰</i> 1.57089 ⁴³ <i>n_{H_γ}²⁰</i> 1.57426 ⁴³ <i>n_{H_γ}²⁰</i>	
C₁₀H₁₂ Cyclopentylidene- cyclopentadiene 		55 to 57 ⁴⁶ @ 2mm			

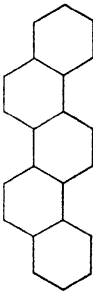
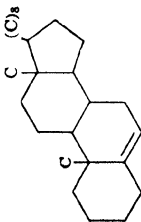
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
2,5-Endomethylene- bicyclo-[0,4,3]-nono- diene-3,7 (Dicyclopentadiene) 	32.9 ²⁴ 32.5 ⁴¹ 32 ^{1, 22, 33, 36}	163 ¹ @ 766mm 170 ^{17, 32} 169.5 to 170 ⁴ 95 @ 55mm ¹⁷ 88 @ 35mm ¹⁷ 70 @ 24mm ³⁶ 69 @ 12mm ³³ 68 to 70 ³⁴ @ 12mm	0.9302 ⁶ @ 77.25° 0.9756 ¹⁷ @ 35° 0.9766 ¹⁷ @ 33° 1.012 ²⁶ @ 17.5° (solid)	1.48031 ⁶ n _{H_a} ^{77.25} 1.51047 ³⁶ n _{H_a} ²⁰ 1.49121 ⁶ n _{H_β} ^{77.25} 1.52181 ³⁶ n _{H_β} ²⁰ 1.49766 ⁶ n _{H_γ} ^{77.25}	
C_nH_{2n-8} C₁₁H₁₄ Cyclohexylidene- cyclopentadiene 		78 to 80 ¹⁶ @ 25mm			
C₁₂H₁₈ [1,4]-Endoethylene- [0,4,4]-bicyclodeca- diene-3,7 		229 to 230 ^{9,10}	0.9944 ³ @ 22°	1.5265 ³ @ 22°	

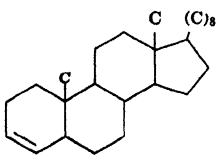
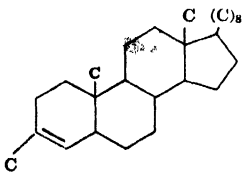
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3,7,7-Trimethyl- [0,4,4]^(1,6)-bicyclo- decatriene-2,4,8 (Irene) 		127 ¹⁸ @ 17mm 113 to 115 ^{15,37} @ 9mm	0.9402 ³⁷	1.5274 ³⁷	
C₁₄H₂₀ 3,4-Cyclohexano- [0,4,4]-bicyclodeca- diene-3,(1,6) 	73 to 74 ¹³				
Decahydrophen- anthrene 	- 18 to - 20 ²⁹	274 to 275 ²⁹ @ 737mm	0.993 ²⁹	1.5335 ²⁹	

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>C_nH_{2n-8}</p> <p>Methyldecahydrophenanthrene</p> 		76.5 ¹¹ @ 1mm			
<p>C₁₈H₂₄</p> <p>1,4,5,8-Di-(endo-methylene)-tetradecahydroanthracene</p> 		157 to 159 ⁸ @ 16mm			
<p>C₁₈H₂₂</p> <p>Decahydrotetene</p> 		336 to 340 ²⁵ 155 to 158 ²⁹ @ 10mm	0.975 ²⁵ 0.9342 ²⁹	1.51501 ³⁹	

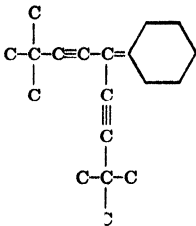
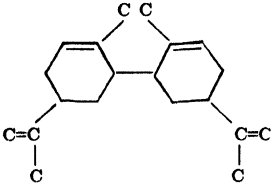
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
C_nH_{2n-1} Hexadecahydro- triphenylene 		186 to 188.5 ²⁸ @ 12mm	0.9518 ²⁸		
Hexadecahydro- chrysene 		360 ²⁰ 168 ³ @ 0.5mm 154 ³ @ 0.3mm	1.0129 ³	1.5442 ³ @ 17°	
C_nH_{2n-8} $C_{20}H_{32}$ α-Camphorene 		190 to 192 ²⁷ @ 12mm 178 to 180 ³⁰ @ 8.5mm 177 to 178 ³¹ @ 6mm 178 ¹⁴ @ 4.5mm	0.8864 ¹⁴ @ 21° 0.8870 ³¹ 0.8844 ³⁰	1.4998 ¹⁴ 1.50339 ³¹ 1.50199 ³⁰	

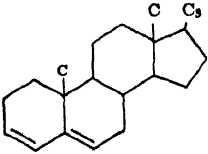
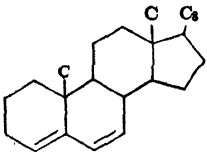
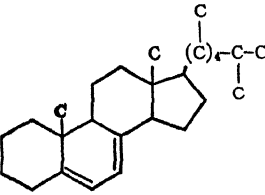
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>C_nH_{2n-8}</p> <p>Sciadopitene</p> 	95 to 96 ²⁴				[α] _D ²⁰ = +11.05° ²⁴
<p>Isosciadopitene</p> 	106 to 107 ²⁴ 110 to 111 ²⁸				[α] _D ²⁰ = +22.13° ²⁴
<p>C₂₂H₃₆</p> <p>9,10-Diisobutyldecahydroanthracene</p> 	86 to 87 ^{22,23}	145 ²² @ 0.01mm			

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<p>$C_{22}H_{36}$</p> <p>Piceneperhydride</p> 	175 ²¹	over 360 ²¹			
<p>$C_{22}H_{36}$</p> <p>Dehydronorcholane</p>	66 to 67 ⁴³				
<p>$C_{27}H_{46}$</p> <p>$C_{27}H_{46}$</p> <p>Cholestene</p> 	90 to 91 ⁹				$[\alpha]_D = -53.05^\circ$ ⁹

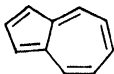
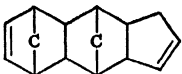
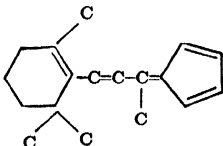
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Pseudocholestene 	77 to 78 ³⁵ 78 to 79 ^{9,19}				$[\alpha]_D = +60.13^\circ$ $[\alpha]_D^{20} = +66.9^\circ$ ³⁵
C₂₈H₄₈ 3-Methyl-Δ³(?)-cholestene 	81 to 82 ⁷				

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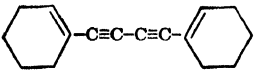
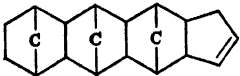
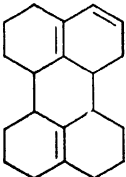
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>C₁₁H₂₂₋₁₀</p> <p>Di-[<i>tert</i>-butyl ethynyl]- cyclohexylidene methane</p> 		105 to 110 ° @ 3mm	0.8578 ° D ₂₀ ²⁰	1.4838 °	
<p>C₂₀H₃₀</p> <p>2-Methyl-5-iso- propenyl-1-(2-methyl- 5-isopropenylcyclo- hexen-2-yl)-cyclo- hexene-2</p> <p>(Biscarvene*)</p> 		169 to 171 ° @ 11mm			*Structure taken from Beilstein.

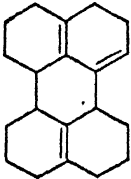
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
Cholestadiene-3,5 	76 ¹ 75.9 to 80 ⁴ 78 to 79 ⁵				[α] _D ²⁵ = -103.24° ⁴ [α] _D = -100° ¹ [α] _D ²¹ = -63.75° ⁵
C_nH_{2n-10} Cholestadiene-4,6 	84 to 85 ⁴				[α] _D ²⁸ = +45.77° ⁴
7-Dehydrocholestene 	88 to 89 ³				

- (1) E. Bergmann and Y. Hirshberg, *Nature* **142**, 1037, 1938.
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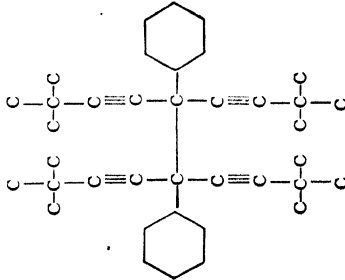
Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>C_nH_{2n-12}</p> <p>[0,3,5]-Bicyclodecapentaene</p> 	98.5 to 99 °				
<p>C₁₅H₁₈</p> <p>Tricyclopentadiene</p> 	60 ^{7,8,9} 66 ² 68 ¹	254 ¹ @ 766mm 110 ⁷ @ 3mm 105 ⁸ @ 3mm 90 to 92 ° @ 0.06mm			
<p>C_nH_{2n-12}</p> <p>C₁₈H₂₄</p> <p>3-Cyclopentadien-2,4-ylidene-1-(2,6,6-trimethylcyclohexen-1-yl)-butene-1</p> <p>(6-(β-[2',6',6'-Trimethylcyclohexen-1-yl]-vinyl)-6-methylfulvene)</p> 		111 to 113 ° @ 0.5mm			



Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
3-Cyclopentadien-2,4-ylidene-1-(2,6,6-trimethylcyclohexen-2-yl)-butene-1 (6-(β-[2',6',6'-Trimethylcyclohexen-2-yl]-vinyl)-6-methylfulvene) <div> </div>		107 to 109 ° @ 5mm			
C₁₁H₂₀₋₁₂ 6,10-Dimethyl-2-cyclopentadien-2,4-ylidene-undecatriene-3,5,9 (6-[4',8'-Dimethylnona-1,3',7']-6-methylfulvene) <div> </div>		139 to 141 ° @ 0.5mm			
C₁₀H₁₆ Tetrahydrotetracyclopentadiene <div> </div>	200 to 202 °				

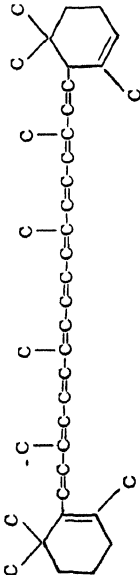
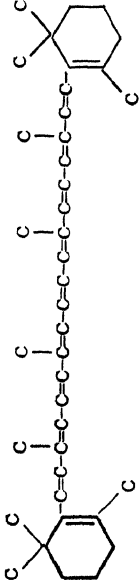
<i>Name and Carbon Skeleton</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-14} Dicyclohexen-1-yl- butadiyne 	62.5 to 63 °				
$C_{20}H_{26}$ Dihydrotetracyclo- pentadiene 	205 °	361 ° @ 766mm			
α -Tetradecahydro- perylene- Δ - 1,2,9,10,9',10' 	180 to 181.5 °				

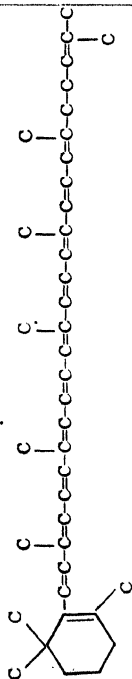
Name and Carbon Skeleton	M. P., °C.	B. P., °C. (@ 760mm)	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>β-Tetradecahydro- perylene-Δ- 3,4,9,10,9',10'</p> 	161 to 162 "				

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Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<p>C_nH_{2n-16}</p> <p>Tetracyclopentadiene</p> 	<p>188 to 190 ¹¹ 190 °</p>	<p>344 ¹ @ 766mm 160 ° @ 1mm 160 to 165 ¹⁰ @ 1mm</p>			
<p>$C_{13}H_{18}$</p> <p>sym-Dicyclohexyl-tetra-<i>tert.</i>-butylethynyl)-ethane</p> 	<p>149 to 150 °</p>				

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p>C_nH_{3n-20}</p> <p>Pentacyclopentadiene</p> 	270 ^{9,10}				
<p>C₃₀H₃₈</p> <p>Hexacyclopentadiene</p> 	373 ⁹				

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D_4^{20}	n_D^{20}	Additional Data
<p>$C_{40}H_{56-24}$</p> <p>α-Carotene</p> 	174 to 175 ⁶ 174.5 to 175.5 ⁷ 182.3 to 182.7 ⁸ 183 ⁴ 187 to 188 ⁵ 183.5 ² uncor.				$[\alpha]_D^{15} = -63^\circ$
<p>β-Carotene</p> 	180.5 ⁸ 182 ² 178 to 180 ⁷ 187 ⁴				

Name and Carbon Skeleton	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
<p style="text-align: center;">γ-Carotene</p> 	178 ⁴				

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XIX. HYDROCARBONS OF UNDETERMINED STRUCTURE

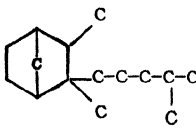
(Thought to belong to the naphthene or cyclic series)

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₁₁H₁₈ Hexahydroeijerene		96 @ 20mm ¹	0.8373 ¹ D ₂₅ ²⁵	1.4577 ¹ @ 25°	
C₁₆H₁₀ Hexahydroelemene		114 to 116 ⁴ @ 10mm	0.8450 ⁴	1.4621 ⁴	[α] _D = -4.8° ⁴
Hexahydro-α- curcumene		128 @ 7mm ²	0.8283 ² D ₃₀ ³⁰	1.4952 ² @ 30°	
Hexahydro-β- curcumene		128 @ 7mm ²	0.8283 ² D ₃₀ ³⁰	1.4552 ² @ 30°	[α] _D ³⁰ = +6.3° ²
d-Tetrahydroferulen		118 to 122 ³ @ 10mm	0.8400 ³	1.45810 ³	[α] _D ³⁰ = +4.2° ³

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<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (n. 760mm)</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₁₁H₂₀₋₂ Dihydrobicycloekasan- talane		204 ° @ 768mm 75 to 77 ° @ 10mm	0.8705 ° @ 15°	1.47151 ° @ 15°	
Tetrahydrogeijerene		95 @ 20mm ¹	0.85058 ¹ D ₂₅ ²⁵	1.4695 ¹ @ 25°	
C₁₁H₁₈ Decahydrochamazulene		119 to 120 ° @ 12mm	0.8808 ° @ 15mm	1.4776 ° @ 15mm	
Decahydro-S-guaiazu- lene		130 to 131 ° @ 13mm 132 to 134 ° @ 12mm	0.8798 ° @ 15° 0.8823 ° @ 15°	1.4783 ° @ 15° 1.4790 ° @ 15°	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-2}					$[\alpha]_D^{15} = +36.99^\circ$ ¹⁴
Tetrahydroatractylene		129 to 130 ¹⁴ @ 10mm	0.9030 ¹⁴ @ 11°	1.49589 ¹⁴ @ 12°	
Tetrahydrobetulene		118 to 120 ⁸ @ 11mm	0.8737 ⁸ @ 18°	1.4744 ⁸ @ 18°	$[\alpha]_D = -3^\circ$ ⁸
Tetrahydrocaryophyllene		122 to 123 ¹⁰ @ 12mm	0.8712 ¹⁰	1.4700 ¹⁰	$[\alpha]_D = +3^\circ$ ¹⁰
Tetrahydroelemene		118 to 120 ⁹ @ 12mm 117 to 119 ⁹ @ 10mm	0.8576 ⁹ 0.8659 ⁹	1.4760 ⁹	$[\alpha]_D = -15.2^\circ$ ⁹ $[\alpha]_D = -20.4^\circ$ ⁹
Tetrahydroguaiene		118 to 119 ¹² @ 7mm 126 to 128 ⁸ @ 12mm	0.8806 ¹² 0.8884 ⁸ @ 15°	1.47840 ¹² 1.4811 ⁸ @ 15°	$[\alpha]_D = +10.52^\circ$ ¹²

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
C_nH_{2n-2} Tetrahydro-α- santalane * 		115 to 116 ¹³ @ 9mm	0.8655 ¹²	1.46908 ¹²	$[\alpha] = +5.6^\circ$ ¹² *Suggested by Si- monsens, "The Ter- penes," Vol. II, p. 548.
Tetrahydrosantalene		116 to 118 ⁷ @ 9mm	0.864 ⁷	1.4676 ⁷	$[\alpha]_D = +7.5^\circ$ ⁷
Tetrahydroselinene		128 to 130 ⁴ @ 12mm 126 to 128 ¹¹ @ 10.5mm 125 to 126 ¹¹ @ 10mm	0.8881 ¹¹ 0.8889 ¹² 0.8903 ⁴ 0.8910 ⁴ 0.8970 ⁴	1.4823 ⁴ 1.48259 ¹¹ 1.4830 ⁴ 1.48375 ¹¹ 1.4877 ⁴	$[\alpha] = +1.12^\circ$ ¹¹
A fully hydrogenated sesquiterpene		265 ¹³	0.8994 ¹³ @ 22°		$[\alpha]^{22} = +5.62^\circ$ ¹³

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (@ 760mm)</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-2} Tetrahydrozingiberene		130 to 135 ° @ 18mm	0.842 ° @ 15°	1.463 ° @ 15°	

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<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-4} Carveprene		183 to 186 ⁹			
Chamene		168 to 170 ¹¹ 86 to 88 ¹¹ @ 50mm	0.8228 ¹¹ @ 25°	1.4686 ¹¹ @ 25°	$[\alpha]_D = +35^\circ$ ¹¹
Citronellal-terpene			0.8535 ⁸	1.4875 ⁸	
Dacrydene		165 to 166 ²⁷	0.8524 ²⁷ D_{16}^{25}		$[\alpha]_D = +14.48^\circ$ ²⁷
Isochamene		88 to 90 ¹¹ @ 50mm	0.8222 ¹¹ @ 25°	1.4726 ¹¹ @ 25°	$[\alpha]_D^{25} = -0.27$ ¹¹

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-4} Norbicycloekasantalane		186 to 189 ¹⁸ 62 to 64 ¹⁸ @ 9mm	0.8827 ¹⁸	1.4779 ¹⁸	[α] _D = -19° ¹⁸
C₁₁H₁₈ Bicycloekasantalane		183.5 ¹⁸ @ 767mm 72 to 74 ¹⁸ @ 10mm 57 to 59 ¹⁸ @ 9mm	0.871 ¹⁸ 0.885 ¹⁸	1.46856 ¹⁸ 1.4774 ¹⁸	
C₁₂H₂₀ Dihydroaromadendrene		121 to 122 ³ @ 10mm	0.9014 ³ @ 17°	1.4871 ³ @ 17°	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M.P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-4}					
Dihydrocopaene		118 to 121 ²⁴ @ 12mm	0.8926 ²⁴ @ 18°	1.47987 ²⁴ temp. not given	$[\alpha] = -12.2^\circ$ ²⁴
Dihydrocyperene		113 to 116 ¹² @ 12mm	0.9332 ¹² <i>D</i> ₁₀ ¹⁹		$[\alpha]_D^{19} = +7.6^\circ$ ¹²
Dihydroguaiene		124 to 125 ¹⁵ @ 15mm 122 @ 11mm ⁷ 102.2 ³⁰ @ 1mm	0.8914 ⁷ @ 25° 0.8955 ¹⁵ 0.9089 ⁷ @ 0°	1.4836 ³⁰ @ 23° 1.49817 ⁷ @ 20.2° 1.4894 ¹⁵	$[\alpha]_D^{18.5} = -26.65^\circ$ ⁷
Dihydro-α-gurjunene		129 ²⁹ @ 14mm	0.9090 ²⁹ 0.8977 ²⁹	1.49061 ²⁹ 1.4897 ²⁹	$[\alpha]_D = -18^\circ$ ²⁹

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (@ 760mm)</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-4}					
Dihydro-β-gurjunene		120 @ 8mm ¹⁹ 115 to 117 ²³ @ 7mm	0.9239 ²³ 0.9172 ²⁹	1.49490 ²³ 1.4922 ²⁹	[α] _D = -42° ²⁹ [α] _D = -37.5° ¹⁹ [α] _D = -37° ²³
Dihydroledene		112 to 115 ¹³ @ 6mm	0.9075 ¹⁸	1.492324 ¹³	
Dihydro-α-santalene			0.899 ¹⁸	1.495 ¹⁹	
Dihydroselinene		138 to 139 ¹⁶ @ 12mm	0.8992 ¹⁶ @ 24°	1.4878 ¹⁶	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
$C_{11}H_{18-1}$ Dihydrosesqui- citronellene		131 to 133 ²² @ 12mm	0.8316 ²²	1.4800 ²²	
Dihydrovetivene		126 to 132 ²¹	0.90734 ²¹	1.48685 ²¹	$[\alpha]_D = -1.8^\circ$ ²¹
Elemene		115 to 119 ¹⁰ @ 10mm	0.8830 ¹⁰ @ 17°	1.4950 ¹⁰ @ 17°	
Ferulene		126 to 128 ²⁰ @ 10mm 124 to 126 ²⁰ @ 7mm	0.8687 ²⁰ 0.8698 ²⁰	1.48377 ²⁰ 1.48423 ²⁰	$[\alpha]_D^{20} = +6^\circ$ ²⁰
Isodihydro- caryophyllene		137 to 138 ¹⁷ @ 19mm 124 to 124.5 ¹⁷ @ 12.75mm	0.8872 ¹⁷ @ 21° 0.919 ¹⁷	1.4880 ¹⁷ @ 21° 1.4925 ¹⁷	$[\alpha]_D = -29.4^\circ$ ¹⁷

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₁₁H₂₀₋₄ Octahydroazulene		123 to 124.5 ¹⁴ @ 10mm	0.8935 ²⁸ @ 25° 0.8967 ¹⁴ @ 15°	1.490 ²⁸ 1.4921 ¹⁴ @ 15°	
Tetrahydrokessylene		105 to 108 ¹ @ 5mm	0.8931 ¹ @ 18°	1.47289 ¹ @ 18°	
C₁₁H₁₈ α-Kayene		33.5 to 34.5 ³¹ @ 8mm	0.8600 ³¹	1.4713 ³¹	[α] _D ²⁰ = -7.9° ³¹
β-Kayene		44.5 to 45.5 ³¹ @ 8mm	0.8591 ³¹	1.4721 ³¹	[α] _D ²⁰ = -15.1° ³¹
C₁₁H₁₆ Dihydroabietene			0.933 ⁶	1.522 ⁶	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
C_nH_{2n-4} Tetrahydroditerpene	26 ⁴				
Tetrahydromanoene		141 to 142 ⁹ @ 0.2mm	0.9158 ⁹	1.5030 ⁹	
Totarene	74.5 to 75 ²⁸				
$C_{40}H_{76}$ Eicosahydrocarotene		206 ²⁸ @ 0.0001mm	0.8748 ²⁸ @ 24.2°	1.4821 ²⁸ @ 24.2°	$[\alpha]_D^{20} = +0.337^\circ$ ²⁸

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<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₈H_{2n-8} Cycloöctatriene		147.2 to 148.2 ¹²² 133 to 135 ¹²¹ @ 715mm 57 to 57.5 ¹²¹ @ 49 to 50mm 36 to 40 ¹²¹ @ 13mm 31.2 to 31.8 ¹²² @ 8mm	0.9086 ¹²² 0.903 ¹²⁰ 0.912 ¹²¹ @ 0° 0.925 ¹²² @ 0°	1.52844 ¹²⁰	
C₁₀H₁₄ <i>p</i>-Menthatriene		183 ¹¹³	0.863 ¹¹³	1.49693 ¹¹³	
C₁₁H₁₆ Methylmenthatriene		90 to 91.5 ¹ @ 21mm 89.2 to 89.4 ¹ @ 18mm 74 to 75 ⁶⁹ @ 10mm 74 to 76 ⁶⁸ @ 9.5mm	0.8728 ⁶⁸ 0.8745 ⁶⁸ 0.8747 ⁶⁸ 0.8748 ⁶⁸ 0.8738 ¹ @ 19.0° 0.8686 ¹ @ 18.8° 0.8776 ⁶⁰ @ 15°	1.5007 ⁶⁹ 1.50152 ⁶⁸ 1.50124 ¹ @ 19.0° 1.49875 ¹ @ 18.8°	$[\alpha]_D = +90.32^\circ$ ⁶⁸ $[\alpha]_D^{21} = +69.12^\circ$ ⁶⁰

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-6} Geijerene					
		85 @ 17mm ⁸⁹	0.8720 ⁸⁹ <i>D₂₀²⁰</i>	1.4888 ⁸⁹	
1,4-Diisopropenyl- cyclohexene-1 or 1-Isopropenyl-4-iso- propylidene-cyclo- hexene-1					
Low boiling	95 to 98 ⁴ @ 20mm	0.8715 ⁴	1.48717 ⁴ <i>n_H²⁰_a</i> 1.50902 ⁴ <i>n_H²⁰_γ</i>		
High boiling	105 to 108 ⁴ @ 20mm	0.8706 ⁴	1.48650 ⁴ <i>n_H²⁰_a</i>		
C₁₁H₁₈ Aromadendrene					<i>[α]_D²⁰ = -6.1°</i>
	121 to 121.4° @ 10mm	0.9116° 0.9157°	1.4978° 1.4993°		
	121 @ 10mm°	@ 17°	@ 17°		

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C_nH_{2n-2}					
Atractylene		260 to 263 ²⁷ 125 to 126 ²⁷ @ 10mm 108 to 109 ¹⁰⁶ @ 3mm	0.9101 ²⁷ D_{16}^{20} 0.9154 ²⁷ D_{16}^{15} 0.9189 ¹⁰⁶ @ 13°	1.50893 ²⁷ 1.51795 ¹⁰⁶ @ 13°	$[\alpha]_D^{15} = +78.35^\circ$ ¹⁰⁶
Azulene terpene	30 to 31 ³	167 to 168.4 ⁸¹ @ 11mm 127 to 128 ⁷⁹ @ 10mm 120 to 122 ⁷⁹ @ 10mm 140 to 145 ⁶⁸ @ 5mm 117 to 120 ⁷⁸ @ 5mm 135.6 ⁸¹ @ 1.1mm	0.98771 ⁸¹ @ 25° 0.98465 ⁸¹ D_{25}^{25} 0.9835 ⁸⁸ @ 15° 0.9134 ⁷⁸ D_{16}^{15}	1.5021 ⁷⁸	$[\alpha]_D = +11.40^\circ$ ⁷⁸
Betulene		123 to 127 ⁹¹ @ 13mm 130 to 132 ¹⁰⁹ @ 20mm	0.9120 ⁹¹ @ 21° 0.9213 ¹⁰⁹	1.4952 ⁸¹ @ 21° 1.5144 ¹⁰⁹	$[\alpha]_D^{21} = +6^\circ$ ⁹¹

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C_nH_{2n-4} Bulnesene		113.5 to 115 ¹¹⁹ @ 6mm	0.9149 ¹¹⁹	1.50467 ¹¹⁹	
Calamene		127 to 130 ⁷⁴ @ 14mm 123 to 126 ⁹⁷ @ 10.5mm	0.9224 ⁹⁷ <i>D</i> ₁₉ ²⁰ 0.9231 ⁷⁴ <i>D</i> ₁₅ ¹⁵	1.50572 ⁹⁷ 1.5023 ⁷⁴ @ 19°	α _D ²⁰ = +5° ⁹⁷
Camarene		263 ⁴² 121 to 122 ⁴² @ 4mm	0.9056 ⁴² @ 30°	1.500 ⁴² @ 30°	α _D ²⁰ = +6.74° ⁴²
Carlinene		139 to 141 ⁸⁶ @ 20mm	0.8733 ⁸⁶ @ 23.8°	1.492 ⁸⁶ @ 23.8°	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (@ 760mm)</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
C_nH_{2n-6}					
α-Caryophyllene					$[\alpha] = -4.97^\circ_{19}$
		130 to 131 ⁶² @ 24mm	0.8923 ⁶² D_{25}^{25}	1.4942 ⁶² @ 25°	$[\alpha] = -24.07^\circ_{16}$
		139 to 140 ¹⁵ @ 19mm	0.8953 ¹⁶ 0.8959 ¹⁶	1.49617 ¹⁷ 1.49665 ¹⁷	$[\alpha]_D^{19} = -26.174^\circ_{17}$
		125 to 125.5 ¹⁷ @ 14.5mm	0.8986 ¹⁹ 0.8990 ¹⁷	@ 19° 1.496 ¹⁹	$[\alpha]_D^{19} = -21.85^\circ_{15}$
		123 to 124 ¹⁷ @ 14.5mm	0.89951 ¹⁷ D_0^{19}	@ 18° 1.496 ¹⁹	$[\alpha]_{4461} = -29.7^\circ_{90}$
		122 to 124 ¹⁶ @ 12mm	0.8965 ¹⁹	@ 16°	
		131 @ 10mm ¹⁹	@ 15mm		

Hydrocarbons of Undetermined Structure	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
C ₁₈ H ₃₄₋₄ Cedrene					[α] _D = -85.5° ⁸³
		264 to 268 ^{117,118}	0.9325 ⁸³ 0.93258 ¹²	1.49798 ⁸² 1.49817 ⁸²	[α] _D = -85° ⁸⁶
		264 ⁸²	0.9338 ⁹⁸	1.5015 ¹³	[α] _D = -82° ¹⁰⁷
		263.5 to 264 ⁸²	0.9342 ⁹⁸	1.50251 ¹³	[α] _D = -67° ¹⁰⁷
		261 to 262 ^{12,14}	0.9345 ⁹⁸	1.5028 ⁸²	
		237 ⁸⁴	0.9359 ^{12,14}	1.50233 ⁸⁹	[α] _D = -60.8° ¹⁰³
		262 to 263 ¹⁰⁸ @ 750mm	0.9362 ¹⁰⁷ 0.9365 ¹⁰⁷	@ 15° 1.4991 ¹²	[α] _D = -60° ^{12,92,107}
		129 to 132 ¹⁰⁷ @ 17mm	0.9385 ¹⁰³	n _H ²⁰ _a	[α] _D = -59° ⁹³
		124 to 126 ⁸⁹ @ 12mm	0.9231 ⁸² @ 18°	1.4964 ²⁹ n _H ¹⁸ _a	[α] _D = -56.51° ¹³
		123 to 124 ⁹⁴ @ 12mm	0.9354 ⁸⁹ @ 15°	1.5011 ²⁰ n _H ¹³ _a	[α] _D = -56.2° ⁹⁴
		118 to 119 ⁹⁶ @ 12mm	0.9366 ⁸² @ 15°	1.5133 ³⁰	[α] _D = -55° ⁸⁹
		131 to 132 ⁶⁷ @ 10mm	0.9367 ⁸² @ 15°	n _H ¹³ _β 1.5258 ³⁰	[α] _D = -47.8° ⁶⁷
		119 ⁸³ @ 10mm		n _H ¹³ _γ	[α] _D = -47.54° ⁸⁴
		116 to 117 ⁹⁸ @ 10mm			
		114 to 115 ⁹⁸ @ 9mm			
		112 to 113 ⁹⁶ @ 7mm			
		119 to 121 ⁸³ @ 3mm			

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
C_nH_{2n-4}					
Clovene					
Fraction I		251 to 253 ⁷² @ 765mm 117 to 119 ⁷² @ 16mm	0.9215 ⁷² @ 18°	1.4968 ⁷² @ 18°	$[\alpha]_D = -29.66^\circ$ ⁷²
Fraction II		260 to 262 ⁷² @ 765mm 122 to 124 ⁷² @ 16mm	0.9244 ⁷² @ 18°	1.4951 ⁷² @ 18°	$[\alpha]_D = -39.66^\circ$ ⁷²
		261 to 263 ¹¹⁴ 131 to 139 ¹⁷ @ 15.5mm 111 to 113 ³⁶ @ 10mm	0.924 ³⁶ 0.92223 ¹⁷ D_0^{19} 0.930 ¹¹⁴ @ 18°	1.4980 ³⁶ 1.4740 ¹⁷ @ 19° 1.50066 ¹¹⁴ @ 18°	$[\alpha]_D = +1.3^\circ$ ³⁶ $[\alpha] = +1.3^\circ$ ¹⁷
α-Costene					$[\alpha]_D = -12^\circ$ ⁸⁸
		122 to 126 ⁸⁸ @ 12mm	0.9014 ⁸⁸ @ 21°	1.49807 ⁸⁸ @ 16°	
β-Costene					$[\alpha]_D = +6^\circ$ ⁸⁸
		144 to 149 ⁸⁸ @ 18mm	0.8728 ⁸⁸ @ 22°	1.4905 ⁸⁸	
Cubebene					$[\alpha]_D = -39.15^\circ$ ⁸⁴
		255 to 260 ¹⁴ 220 ⁸⁴	0.915 ⁸⁴ @ 15°		

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (at 760mm)</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-6} α-Curcumene		128 to 130 ⁶³ @ 9mm	0.8633 ⁶³ D ₃₀ ³⁰	1.4944 ⁶³ @ 30°	[α] _D ³⁰ = -22.9° ⁶³
β-Curcumene		128 to 130 ⁶³ @ 6mm	0.8810 ⁶³ D ₃₀ ³⁰	1.4940 ⁶³ @ 30°	[α] _D ³⁰ = -27.9° ⁶³
Curcumene		139 to 142 ⁴⁵ @ 13mm 140 to 142 ⁸⁴ @ 12mm	0.9235 ⁴⁵ @ 24°	1.50594 ⁴⁵ @ 24°	[α] _D ³⁰ = +16.35° ⁴⁵
Cyclolinaloolene		165 to 167 ⁸⁵	0.8112 ⁸⁵	1.4602 ⁸⁵	
Cyclosesquictronellene		129 to 132 ⁹⁸ @ 15mm	0.8892 ⁹⁸	1.5069 ⁹⁸	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
$C_{11}H_{18-6}$ Cyperene		110 to 115 ⁴⁹ @ 7mm	0.9372 ⁴⁹ D_{11}^{13}	1.50127 ⁴⁹ @ 13°	$[\alpha]_D^{13} = +1.5^\circ$ ⁴⁹
α-Cyperene		132 to 133 ⁷ @ 15mm			
Dicyclic sesquiterpene		115 to 117 ⁶³ @ 7mm	0.8932 ⁶³ D_{30}^{30}	1.4936 ⁶³ @ 30°	$[\alpha]_D^{30} = -11.9^\circ$ ⁶³
Dysoxylonene		136 to 137 ⁵⁸ @ 10mm	0.9236 ⁵⁸ @ 15°	1.5063 ⁵⁸	
Elemene		115 to 117 ⁹² @ 10mm	0.8797 ⁹²		

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (@ 760mm)</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-6}					
Equinopanocene		135 to 138 ⁴⁶ @ 15mm	0.9051 ⁴⁶ @ 5°	1.5013 ⁴⁶ @ 15°	[α] _D ⁵ = +33.5° ⁴⁶
Fokienene		112 to 114 ³¹ @ 7mm	0.8802 ³¹ @ 15°	1.49594 ³¹ @ 13°	[α] _D ¹⁶ = +16.93° ³¹
Galipene		255 to 260 ¹⁴	0.912 ¹⁴ @ 19°		
Gonystylene		137 to 139 ²³ @ 17mm	0.9183 ²³ @ 17°	1.5134 ²³ @ 15°	[α] _D ¹⁷ = +40° ²³

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (n 760mm)</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
C_nH_{2n-6} Guaiene					$[\alpha]_D = -16.8^\circ$ ⁷⁵
		135 to 138 ³⁵ @ 14mm	0.8954 ²⁸ @ 25°	1.49468 ²⁸ @ 25°	$[\alpha]_D^{20} = -40.35^\circ$ ²⁷
		134 to 136 ³ @ 22mm	0.9085 ²⁷ 0.9182 ³⁵	1.5022 ⁷⁵ 1.50114 ¹¹⁶	$[\alpha]_D^{28} = -66.11^\circ$ ²⁸
		128 to 130 ⁷⁵ @ 12mm	0.910 ¹¹⁶ 0.9115 ⁷⁵	1.50049 ²⁷	
		124 ²⁸ @ 11mm	@ 19° 0.9133 ²⁸		
		123 to 124 ²⁷ @ 9mm	@ 0°		
		124 to 128 ¹¹⁶ @ 13mm			
α-Gurjunene					$[\alpha] = -95^\circ$ ⁹⁰
		114 to 116 ⁹⁰ @ 10mm	0.919 ¹⁰⁸ 0.918 ⁹⁰	1.5010 ⁹⁰ 1.501 ¹⁰⁸	$[\alpha]_D = -90^\circ$ ⁷²
		122 to 126 ⁷⁵ @ 12mm	0.9285 ⁷⁵ @ 15°	1.5047 ⁷⁵ @ 15°	
		119 ¹⁸ @ 12mm			
iso-α-Gurjunene					$[\alpha]_D = -135^\circ$ ¹⁰⁸
			0.9109 ¹⁰⁸	1.5101 ¹⁰⁸	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-6} β-Gurjunene		120 to 123 ⁹⁰ @ 13mm 122.5 to 123.5 ¹⁸ @ 12mm 113.5 to 114 ⁹⁹ @ 7mm	0.9348 ⁹⁰ 0.9329 ⁹⁹ 0.9321 ¹⁰⁸	1.50526 ⁹⁹ 1.50275 ⁹⁰ 1.5022 ¹⁰⁸	[α] _D = +74.5° ⁹⁰ [α] _D = +70.5° ¹⁰⁸
iso-β-Gurjunene			0.9313 ¹⁰⁸	1.5109 ¹⁰⁸	[α] _D = -36° ¹⁰⁸
Hexahydro- chamazulene		118 to 124 ⁷⁶ @ 11mm	0.9117 ⁷⁶	1.5200 ⁷⁶	
Humulene		263 to 266 ¹¹ 132 to 137 ²⁵ @ 13mm	0.8977 ¹¹ <i>D</i> ₂₀ ²⁰ 0.9001 ¹¹ <i>D</i> ₁₅ ¹⁵	1.5021 ¹¹ @ 19° 1.4978 ¹¹ <i>n</i> _H ¹⁹ _A	[α] _D ²⁰ = -0.5° ¹¹

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₁₅H₂₄₋₅ Isocamerene		253 ⁴² 110 to 111 ²⁸ @ 5mm	0.8942 ⁴² @ 30°	1.4925 ⁴² @ 30°	$[\alpha]_D^{27} = -11.21^\circ$ ⁴²
Isoclovene		130 to 131 ³⁶ @ 12mm	0.943 ³⁶ @ 19°	1.5039 ³⁶ @ 19°	$[\alpha]_D^{14} = -56.6^\circ$ ³⁶
Isocostene		130 to 135 ⁸⁸ @ 12mm	0.9062 ⁸⁸ @ 21°	1.50246 ⁸⁸	$[\alpha]_D = +31^\circ$ ⁸⁸
Isofokienene Fraction I		95 to 96 ³² @ 3mm	0.9075 ^{31,32}	1.5041 ³² @ 21°	$[\alpha]_D^{21} = +5.92^\circ$ ³²
α-Isosantalene		225 to 256 ³³			$[\alpha]_D = +6.1^\circ$ ³³

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>\dot{D}_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
C₁₅H₂₄₋₂ β-Isosantalene		259 to 260 ³³			$[\alpha]_D^{24} = +16.89^\circ$ ³³
Isosesquichamene		265 to 268 ¹¹¹ 129 to 131 ^{43,44,111} @ 12mm	0.9320 ^{44,111} @ 21.5° 0.9367 ¹¹¹	1.5109 ^{44,111} @ 21.5° 1.5009 ¹¹¹	$[\alpha]_D^{21.5} = -8.52^\circ$ ¹¹¹ $[\alpha] = -15.7^\circ$ ¹¹¹ $[\alpha]_D^{21.5} = -8.532^\circ$ ⁴⁴
Machilene		142 to 144 ⁷³ @ 20mm	0.9267 ⁷³ @ 15°	1.5104 ⁷³ @ 15°	$[\alpha]_D = +63^\circ$ ⁷³
Patchoulene		255 to 256 ⁸¹ 254 to 256 ¹¹⁶ 252 to 255 ⁶² @ 743mm 112 to 115 ²⁷ @ 12 to 12.5mm	0.939 ¹¹⁶ @ 23° 0.9296 ²⁷ 0.9334 ⁸¹ @ 15° 0.937 ⁶² @ 13.5° 0.946 ⁶² @ 0°	1.49835 ²⁷ 1.50094 ¹¹⁶	$[\alpha]_D^{20} = -38.08^\circ$ ²⁷ $[\alpha]_D = -42.10^\circ$ ⁵¹ $[\alpha]_D = -36.52^\circ$ ⁸¹

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₁₅H₂₄-1 Populene		121 to 122 ⁵⁴ @ 8mm	0.9135 ⁵⁴ @ 15°	1.504 ⁵⁴ @ 15°	[α] _D = +21.22° ⁵⁴
γ-Santalene		118 to 120 ⁸⁷ @ 9 to 10mm	0.9355 ⁸⁷	1.5042 ⁸⁷	
Sesquibenhene		127 to 131 ⁴¹ @ 10°	0.9162 ⁴¹ @ 14°	1.5058 ⁴¹ @ 24°	[α] _D ²⁴ = +35.7° ⁴¹
Sesquichamene		112.5 to 123.5 ^{43,44} @ 12mm	0.9277 ^{43,44} @ 28°	1.5021 ^{43,44} @ 28°	[α] _D ²⁸ = -89.85° ^{43,44}
Sesquictronellin		138 to 140 ⁹⁸ @ 9mm	0.8489 ⁹⁸	1.53252 ⁹⁸	[α] _D = +0.36° ⁹⁸

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₁₅H₂₄₋₆					
Sesquiterpene-1		140 ^{13a} @ 26mm	0.902 ^{13a} @ 15°		
Sesquiterpene-2		153 to 154 ^{13a} @ 26mm	0.9247 ^{13a} @ 15°		[α] _D = +50° ^{13a}
Sesquiterpene from aliharz oil		270.8 to 271 ⁸³ @ 754mm	0.9190 ⁸³ @ 15°	1.52252 ⁸³ @ 15°	[α] _D = +131.99° ⁸³
Sesquiterpene from balsoharz balsam		118 to 119 ² @ 8mm	0.9104 ² @ 30°	1.4956 ² @ 30°	[α] _D ³⁰ = +116.4° ²
Sesquiterpene from caryophyllene-dihydro- chloride			0.9191 ¹⁰²	1.49901 ¹⁰²	[α] = -35.39° ¹⁰²

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
$C_{15}H_{24}$ Sesquiterpene from citronellol		272 to 275 ⁸⁰ 170 to 172 ⁸⁰ @ 16mm 157 ⁸⁰ @ 15mm	0.8643 ⁸⁰ @ 15°		
Sesquiterpene from Ethereal Oil of Pittos- porum		263 to 264 ⁶¹ 167 to 171 ⁶¹ @ 60mm	0.9100 ⁶¹ D_{15}^{15}	1.5030 ⁶¹	
Sesquiterpene from alcohol from Capaiba balsam		252 ¹¹² @ 759mm	0.952 ¹¹² @ 15°	1.5189 ¹¹² @ 15°	$[\alpha]_D = -61.7^\circ$ ¹¹²

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-6} Sesquiterpene from Matico Oil					[α] _D = -10.83° ¹⁰⁶
		138 to 139 ¹⁰⁶ @ 17mm 133 to 134 ¹⁰⁶ @ 11mm	0.914 ¹⁰⁶ 0.916 ¹⁰⁶	1.50542 ¹⁰⁶ 1.50808 ¹⁰⁶ <i>n_{H_a}²¹</i> 1.52177 ¹⁰⁶ <i>n_{H_β}²¹</i> 1.53028 ¹⁰⁶ <i>n_{H_γ}²¹</i>	
Sesquiterpene from Ysop Oil		125 ⁷⁵ @ 12mm	0.9116 ⁷⁵ @ 17°	1.5012 ⁷⁵ @ 17°	
Sesquiterpene from Cubebene Oil		274 to 275 ¹¹⁵	0.918 ¹¹⁵	1.50467 ¹¹⁵	
Sesquiterpene from Eucalyptus Globulus Oil		124 to 127 ⁷⁵ @ 12mm	0.9078 ⁷⁵	1.4969 ⁷⁵	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₁₅H₂₆-6 Sesquiterpene from Eucalyptus Globus Oil		127 to 131 ⁷⁵ @ 12mm	0.9172 ⁷⁵	1.5001 ⁷⁵	
Sesquiterpene		266 ²⁸	0.9269 ²⁸ @ 30°	1.5094 ²⁸ @ 30°	
Sesquiterpene		265.5 to 266 ¹⁰¹ @ 750mm	0.9326 ¹⁰¹ @ 15°	1.50602 ¹⁰¹	$[\alpha]_D = +58.40^\circ$ ¹⁰¹
Sesquiterpene		247 to 248 ¹⁰¹ @ 748mm	0.8956 ¹⁰¹ @ 15°	1.49287 ¹⁰¹	$[\alpha]_D = -55.48^\circ$ ¹⁰¹
Sesquiterpene from Cymbopogon Sennaarensis, Chiov Oil		150 to 155 ⁶⁶ @ 27mm	0.9114 ⁶⁶ <i>D</i> ₁₅ ¹⁵		$[\alpha]_D^{23} = +24.40^\circ$ ⁶⁶
Sesquiterpene		127 ⁵³ @ 14mm	0.8961 ⁵³ @ 30°	1.4990 ⁵³ @ 30°	$[\alpha]_D^{30} = +16.1^\circ$ ⁵³

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₁₁H₂₄₋₆ Sesquiterpene		122 to 127 ³⁹ @ 10mm		1.527 ³⁹ @ 17°	
Terebenthene		155.4 to 155.8 ¹⁰ @ 748.9mm	0.8685 ²² @ 25° 0.867 ⁶⁵ @ 17°	1.4648 ²² @ 15°	[α] _D = +3.2° ⁶⁵ [α] _D = -40.3° ²²
Vetivene					[α] _D = -10.20° ⁹⁵
Bicyclic		137 to 140 ⁹⁵ @ 16mm 132 to 133 ⁷¹ @ 12mm	0.9321 ⁹⁵ 0.9339 ⁷¹ @ 15°	1.51896 ⁹⁵ 1.5179 ⁷¹	
Vetivene					
Tricyclic		123 to 130 ⁹⁵ @ 16mm 126 to 127 ⁷¹ @ 12mm	0.9335 ⁹⁵ 0.9372 ⁷¹ @ 15°	1.51126 ⁹⁵ 1.5143 ⁷¹ @ 15°	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
C_nH_{2n-6}					
Dihydrocyclosclarene		122 to 128 ⁴⁰ @ 0.15mm	0.9288 ⁴⁰ @ 25° 0.9296 ⁴⁰ @ 24°	1.5075 ⁴⁰ @ 25°	$[\alpha]_D = +33.4^\circ$ ⁴⁰
Dihydroisomanoene		123 to 124 ³⁸ @ 0.2mm	0.9164 ³⁸ @ 19°	1.5048 ³⁸ @ 19°	
α-Dihydromanoene		149 to 150 ³⁸ @ 0.3mm	0.9206 ³⁸ @ 21°	1.5089 ³⁸ @ 21°	
α-Dihydropodocarprene					$[\alpha]_D^{20} = -15.85^\circ$ ⁵⁶
	83 to 84 ⁵⁶				
β-Dihydropodocarprene					$[\alpha]_D = +7.80^\circ$ ⁵⁶
		203 to 204 ⁵⁶ @ 17mm		1.5121 ⁵⁶	
α-Dihydrophyllocladene					$[\alpha]_D^{25} = +23.25^\circ$ ⁵
	73 to 74 ⁵				
β-Dihydrophyllocladene					
	55 ⁵				

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-6} Kaurene	86 to 87 ³⁷		0.9282 ³⁷ @ 106° 0.9330 ³⁷ @ 100°	1.4912 ³⁷ @ 100°	
C₂₇H₄₄ Allo-α-ergostane	84 to 85 ⁶⁴				[α] _D = +17.0° ⁶⁴
Bombisestane	79 ⁴⁸ 81 ⁴⁷				[α] _D ¹⁸ = +18.6° ⁴⁸
Cholestane	79 ¹¹⁰ 71 ¹⁰⁴ 70 to 71 ⁸				[α] _D = +24.59° ¹¹⁰

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (@ 760mm)</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-6} Lupane	184 to 185 ²⁰				
Soja-γ-sitostane	87 ⁵				$[\alpha]_D^{18} = +20.2^\circ$ ⁴
$C_{28}H_{50}$ Pseudoergostane	64 ²⁴				$[\alpha]_D^{18} = +25.3^\circ$ ²⁴
Ergostane	81 to 82 ²⁴ 82 ²¹				$[\alpha]_D^{18} = +22.9^\circ$ ²⁴
$C_{30}H_{64}$ Artostane	101 ⁵⁵				

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-6} Stigmastane	84 to 84.5 ¹²³				

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<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₁₅H₂₂₋₁ Calamenene		136 to 140 ⁴⁴ @ 12mm	0.942 ⁴⁴ @ 16°	1.5239 ⁴⁴ @ 16°	
Dehydrobetulene		112 to 114 ⁵⁷ @ 9mm	0.9186 ⁵⁷ @ 23°	1.5052 ⁵⁷ @ 23°	[α] _D ²³ = -68° ⁵⁷
C₁₅H₂₂ Dinormenthadiene		170 to 172 ³⁶ @ 16mm			
C₁₅H₂₀ Abietine also "Diterebentyl"		253 to 255 ¹⁸ @ 82 to 85mm 210 to 211 ³⁵ @ 26.5mm 199 to 200 ¹⁸ @ 13mm	0.977 ³⁵		

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-8} l-Bifenchene		321 to 325 ⁵⁶ @ 751mm	0.9488 ⁵⁶ @ 15°	1.50762 ⁵⁶	[α] _D = -5.15° ⁵⁶
γ-Camphorene		176 to 178 ^{28a} @ 4.5mm	0.8875 ^{28a} @ 19°	1.5030 ^{28a} @ 19°	
Colophen		318 to 320 ¹³			
α-Cryptomerene	61 ⁵⁰	345 ⁵⁰ 198 ⁵⁰ @ 15mm			[α] _D = +34.22° ⁵⁰
β-Cryptomerene	212 ⁵⁰ with sub- lima- tion				

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-8} Dacrene	96 ^{1,7}			1.5120 ⁷ (@ 13°)	Briggs states that Dacrene, Sciadopitene, and Phyllocladene are identical and that the use of the names Dacrene and Sciadopitene should be discontinued in the literature.
Dicarvenene		170 to 173 ⁴⁶ @ 10mm	0.928 ⁴⁶	1.5175 ⁴⁶	
Dicinene		329 to 334 ³² 328 to 333 ²³ 182 ³² @ 13mm			
Diisocarvestrine		188 to 190 ¹⁹ @ 20mm			

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
$C_{20}H_{32-8}$ Diisochamene		155 to 156 ²⁸ @ 4mm	0.9150 ²⁸	1.5134 ²⁸	$[\alpha]_D^{20} = -0.7^\circ$ ²⁸
Dipinene		183 to 184 ¹¹ @ 15mm	0.9260 ¹¹	1.5174 ¹¹	
Diterpene	57 to 58 ²⁴ 55.5 ³⁸	320 ³⁸ 184 to 186 ²⁴ @ 10mm 140 to 142 ²⁴ @ 1mm	0.9631 ²⁴ @ 60° 0.9686 ²⁴	1.5132 ²⁴ @ 60° 1.5150 ²⁴ @ 56° 1.5208 ²⁴ @ 25° 1.5244 ²⁴	$[\alpha]_{4401}^{25} = -1.11^\circ$ ²⁴
Diterpene		178 ⁸² @ 8mm			$[\alpha]_D = +214^\circ$ ⁸²
Diterpene		156 to 160 ⁴² @ 13mm	0.8966 ⁴² D_{20}^{20}	1.5048 ⁴²	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_t²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C₂₀H₃₂₋₃					
Diterpene from 1- Pinene and Limonene in the presence of HCl		330 to 332 ³³ 174 to 178 ³³ @ 11mm	0.932 ³³ @ 17.5°	1.51983 ³³	
Diterpene		180 to 185 ²⁰ @ 15mm	0.9309 ²⁰ D ₃₀ ²⁰	1.5168 ²⁰ @ 30°	
Diterpene		142 to 143 ² @ 4mm	0.8654 ² D ₀ ²³	1.5080 ² @ 23°	
Diterpenes from l-α-Phellandrene					[α] _D ³⁰ = +14.96° ¹²
		182 to 184 ¹² @ 16mm	0.9257 ¹²	1.5171 ¹²	
oil from Eucalyptus dives					[α] _D ³⁰ = +13.20° ¹²
		193 to 195 ¹² @ 24mm	0.9245 ¹²	1.5178 ¹²	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D_4^{20}</i>	<i>n_D^{20}</i>	<i>Additional Data</i>
C_nH_{2n-2}					
oil from <i>Eucalyptus phellandra</i>		194 to 196 ¹² @ 24mm	0.9272 ¹²	1.5173 ¹²	$[\alpha]_D^{20} = +3.28^\circ$ ¹²
oil from <i>Melaleuca acuminata</i>		191 to 193 ¹² @ 22mm	0.9303 ¹²	1.51813 ¹²	$[\alpha]_D^{20} = +1.00^\circ$ ¹²
Diterpene		173 to 183 ⁴¹ @ 13mm	0.9361 ⁴¹	1.5170 ⁴¹	
Diterpene with 3 double bonds		170 ¹⁷ @ 12mm	0.923 ¹⁷	1.5143 ¹⁷	
Diterpene-bicyclic with 3 double bonds		178 to 180 ⁴⁰ @ 6mm	0.8892 ⁴⁰	1.4884 ⁴⁰	$[\alpha]_D = +1.64^\circ$ ⁴⁰

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-8} Diterpilene		210 to 212 ³⁴ @ 4mm	0.9404 ³⁴ @ 0°		
Isodacrene	107 ⁴ 107 ¹				[α] _D = +48.4° ¹
Isophyllocladene	110.5 to 112 ⁹ 108 to 109 ¹⁰				[α] _D ¹⁷ = +23.4° ⁹
Methylabietine		135 to 138 ⁴⁵ @ 0.15mm	0.9734 ⁴⁵ @ 24°	1.5313 ⁴⁵ @ 24°	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-8} Phyllocladene	95 ⁴⁸ 98 ⁹				$[\alpha]_D^{25} = +15.8^\circ$ ⁹ $[\alpha]_D = +16.06^\circ$ ⁴⁸
Pinaconane	98 ⁵				
α-Podocarpene	50 ³⁸				$[\alpha]_D^{20} = -111.71^\circ$ ³⁸
β-Podocarpene		188 to 190 ³⁸	0.9688 ³⁸ @ 15°	1.5203 ³⁸	$[\alpha]_D^{20} = -15.88^\circ$ ³⁸
δ-Podocarpene	65 ²⁹				$[\alpha]_D^{11} = -27.1^\circ$ ²⁹
Sclarene		125 to 128 ⁴³ @ 0.2mm	0.9388 ⁴³ @ 17°	1.5217 ⁴³ @ 17°	$[\alpha]_D = -14^\circ$ ⁴³

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-6}					
Tetracyclic Diterpene		185 to 186 ²⁷ @ 12mm	0.9648 ²⁷ @ 25°	1.5185 ²⁷ @ 25°	[α] _D ²⁵ = -25.1° ²⁷
Tricyclic Diterpene		179 to 182 ³ @ 12mm	0.9482 ³		
C₂₁H₃₄		135 ²⁶ @ 0.2mm	0.9212 ²⁶ @ 16°	1.5114 ²⁶ @ 16°	
C₂₂H₃₄	79 ⁸³				
C₂₃H₃₈ Dehydrocholane		213 to 218 ⁸³ @ 12mm 210 to 213 ⁸³ @ 12mm			

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-8} Amyranene	182 to 183 ¹⁴				
Bombicestene	91 to 92 ³⁰				
Inagostene	89 ³¹				$[\alpha]_D^{20} = -50.7^\circ$ ³¹
Lupene	180 to 181 ¹⁴				
Microcionastene	61 to 62 ⁴				

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-8}					
Necholestene	71 to 74 ²²				
Pseudositostene	69 ⁸				
Soja-γ-sitostene	73 ⁸ 76 to 77 ¹⁵				[α] _D = -59.3° ⁸
α-Ergostene	77 to 78 ^{22a}				[α] _D ²² = +11° ^{22a}
β-Ergostene	87 to 88 ^{22b} 86 to 87 ¹⁵ 78 ¹⁵				[α] _D = +21.3° ^{22b}

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-8} Δ^{24} -Pseudoergostene	103 ¹⁸				$[\alpha]_D^{17} = +20.3^\circ$ ¹⁸
$C_{30}H_{52}$ Cryptostene	74.5 to 76 ⁵⁴				$[\alpha]_D^{19} = +60.1^\circ$ ⁵⁴

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Hydrocarbons of Undetermined Structure	M. P., °C.	B. P., °C. @ 760mm	D ₄ ²⁰	n _D ²⁰	Additional Data
C_nH_{2n-10}					
α-Cholesterylene					[α] _D = -116.20° ¹⁹
	79 to 80 ^{13,10}	257 to 267 ²⁰ @ 12mm	0.9572 ²⁰	1.52027 ²⁰	[α] _D = -109.30° ²²
	79 ^{20,21}				[α] _D = -107° ²³
	78.2 ¹²				[α] _D = -102.1° ¹⁰
	78 ^{3,10}				
	77 ^{22,23}				[α] _D = -61.55° ²¹
	75.5 ²				[α] _D = -47.7° ²⁰
	74 to 76 ¹¹				[α] _D ¹⁸ = -17.53° ¹²
β-Cholesterylene					
	59 ³				
α-Ergostadiene					[α] _D ²² = -10° ⁹
	124 to 125 ⁹				
β-Ergostadiene					[α] _D ²² = -33° ⁹
	66 to 67 ⁹				
Dehydroergostene					[α] _D ²² = -15° ¹⁴
	71 to 72 ¹⁴				

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (@ 760mm)</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-10}					
Amyrene		120 ⁴ @ 15mm			$[\alpha]_D^{20} = +44.9^\circ$ ⁴
α-Amyrene I	96 to 97.5 ²⁴				$[\alpha]_D^{19} = +72.2^\circ$ ²⁴
β-Amyrene	98 ¹⁸	252 ¹⁸ @ 12mm			
β-Amyrene Ib	104 ²⁴				$[\alpha]_D = +98.9^\circ$ ²⁴
β-Amyrene I	89 to 91.5 ²⁴				$[\alpha]_D = +77.6^\circ$ ²⁴
β-Amyrene Ia	209 to 210 ²⁴				$[\alpha]_D^{19} = +115^\circ$ ²⁴
α-Amyrene II	120 to 122 ²⁴				
β-Amyrene II	162 ²⁴				$[\alpha]_D^{19} = +94.6^\circ$ ²⁴
β-Amyrene III	187 to 189.5 ²⁴				$[\alpha]_D^{19} = -22^\circ$ ²⁴

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-10}					
Amyrene (<i>Continued</i>)					
β-Amyrene IV	159 to 161 ²⁴				[α] _D ¹⁸ = +57.3° ²⁴
Dihydro-α-amyrilene	84 to 85 ¹⁶		0.841 ¹⁶ (solid)		[α] _D = +120.2° ¹⁶
Dihydro-β-amyrilene					
I	83 to 85 ¹⁶		0.846 ¹⁶ (solid)		[α] _D = +131.5° ¹⁶
II	92 to 93 ¹⁷		0.941 ¹⁷ @ 102°		[α] _D = +77° ¹⁷
Friedelene	257 to 258 ⁵				
Isolanostene	80 to 81 ⁶				

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-10}					
Lanostene	76 to 77 °				
Oleanene	193 ²⁵				$[\alpha]_D^{25} = +56.5^\circ$ ²⁵
Oleanene I	113 to 116 ²⁴				
Oleanene II	193 ²⁴				
Oleanene III	225 to 226 ²⁴				$[\alpha]_D^{20} = +30.1^\circ$ ²⁴

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-10} Iso-tetracyclosqualene		228 to 230 ° @ 3mm	0.9237 ° D ₂₀ ²⁰	1.5098 °	
α-Viscane	98 ¹				
β-Viscane	136 ¹				
$C_{31}H_{52}$ Methyl friedelene	272 to 274 °				
$C_{46}H_{86}$ Thevetene	79 to 80 °				

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<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-12} Chamazulene		159 ¹⁷ @ 11mm	0.9881 ¹⁷ @ 18°		
Elemazulene			0.9355 ¹⁴ @ 79° 0.9735 ¹⁴ @ 19°		
S-guaiazulene		167 to 168 ¹⁴ @ 12mm 164 ¹⁷ @ 11mm	0.9333 ¹⁴ @ 80° 0.9712 ¹⁴ @ 23° 0.9728 ¹⁴ @ 19° 0.9759 ¹⁷ @ 18°		
C₂₀H₂₈ Diterpene		194 to 199 ¹⁰ @ 17mm 190 to 194 ¹⁰ @ 14mm	0.9494 ¹⁰ 0.9244 ¹⁰	1.5303 ¹⁰ 1.5280 ¹⁰	

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-12} Dihydroergotetraene-A	98 ¹⁸				$[\alpha]_D^{16} = +121^\circ$ ¹⁸
Ergostatriene-D	134 to 135 ⁹				$[\alpha]_D^{23} = +42.7^\circ$ ⁹
$C_{29}H_{46}$ Oleanylene	185 to 186 ²⁴				$[\alpha]_D^{20} = +96.4^\circ$ ²⁴
Oleanylene	182 ¹¹				
Oleanylene I	145 to 149 ²³				$[\alpha]_D^{22} = +78.9^\circ$ ²³
Oleanylene II	186 ²³				
Oleanylene III	178 to 182 ²³				

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-12}					
α-Amyrilene					$[\alpha]_D = +109.48^\circ$ ¹
d-form	135 ²¹ 134 ^{16,22} 134 to 135 ¹⁹ 133 to 134 ¹³	450 ²³ 285 ²² @ 15mm	0.9532 ¹⁶ @ 137.0°	1.5107 ¹⁶ @ 137.0°	$[\alpha]_D = +109.5^\circ$ ²¹
l-form	193 to 194 ²⁰				$[\alpha]_D = -104.9^\circ$ ¹²
α-Amyrilene I	133 to 135 ²³	235 ¹⁸ @ 0.1mm	0.9857 ¹⁵ @ 38°	1.5420 ¹⁵ @ 38°	
α-Amyrilene II	119 to 120 ²³				$[\alpha]_D^{19} = +136.6^\circ$ ²³
β-Amyrilene	175 to 178 ^{19,21} 173 to 175 ¹⁶	235 ¹⁵ @ 0.1mm	0.9268 ¹⁶ @ 173.2° 0.9807 ¹⁵ @ 38°	1.4973 ¹⁶ @ 173.2° 1.5409 ¹⁴ @ 38°	$[\alpha]_D = +112.19^\circ$ ¹ $[\alpha]_D = +111.3^\circ$ ²¹

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-12}					
β-Amyrilene I	170 to 175 ²³				
β-Amyrilene II	147 to 148 ⁵ 148 to 150 ²³				$[\alpha]_D^{19} = +139.3^\circ$ ²³
β-Amyrilene III	103 ⁵				$[\alpha]_D^{22} = +155^\circ$ ⁵
γ-Amyrilene	175 ⁶				$[\alpha]_D^{20} = +54.1^\circ$ ⁶
α-Latucene	207 ⁴				
α-Viscene	169 ²				$[\alpha]_D^{20} = +120.2^\circ$ ²

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. @ 760mm</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-12} β-Viscene	161 ²				$[\alpha]_D^{20} = +32.2^\circ$ ²
C₃₁H₅₀ β-Euphorbodiene		232 to 235 ³ @ 5mm			
C_nH_{2n-18} C₂₇H₄₀ Ergotetraene A	97 ¹⁸				$[\alpha]_D^{18} = +176^\circ$ ¹⁸
Ergotetraene B	105 ¹⁸				$[\alpha]_D = +93^\circ$ ¹⁸
Ergotetraene C	98 ⁷				$[\alpha]_D^{20} = +121^\circ$ ⁷

<i>Hydrocarbons of Undetermined Structure</i>	<i>M. P., °C.</i>	<i>B. P., °C. (@ 760mm)</i>	<i>D₄²⁰</i>	<i>n_D²⁰</i>	<i>Additional Data</i>
C_nH_{2n-18} Lumistatetraene	88 to 90 ^s				[α] _D ²⁴ = +298.9° ^s

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